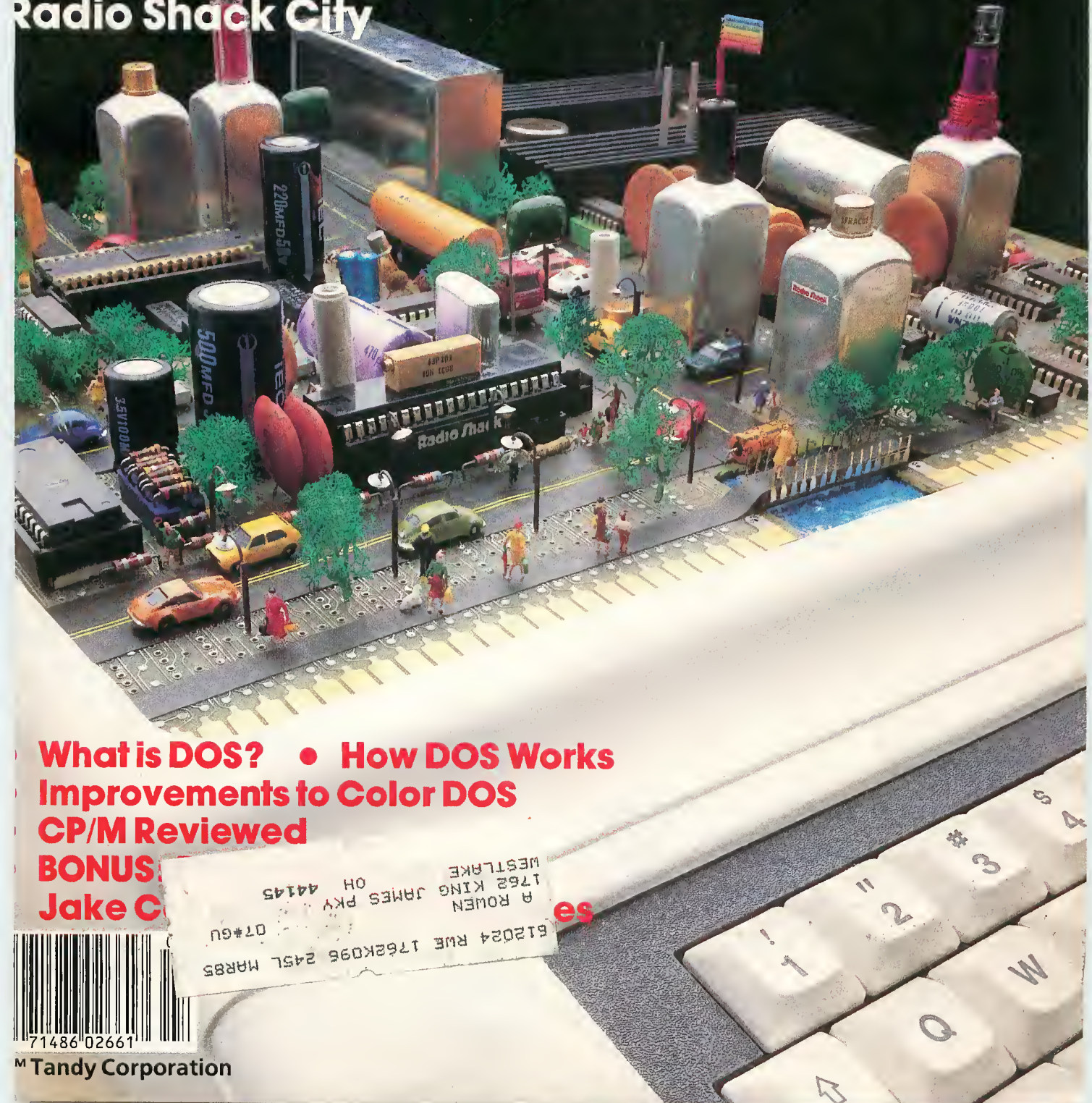


THE Color^{*} Computer^{*} MAGAZINE

July 1984
\$2.95

For Users of TRS-80™ Color Computers

Controlling Computer Traffic in Radio Shack City



What is DOS? • How DOS Works
Improvements to Color DOS
CP/M Reviewed
BONUS!
Jake C...

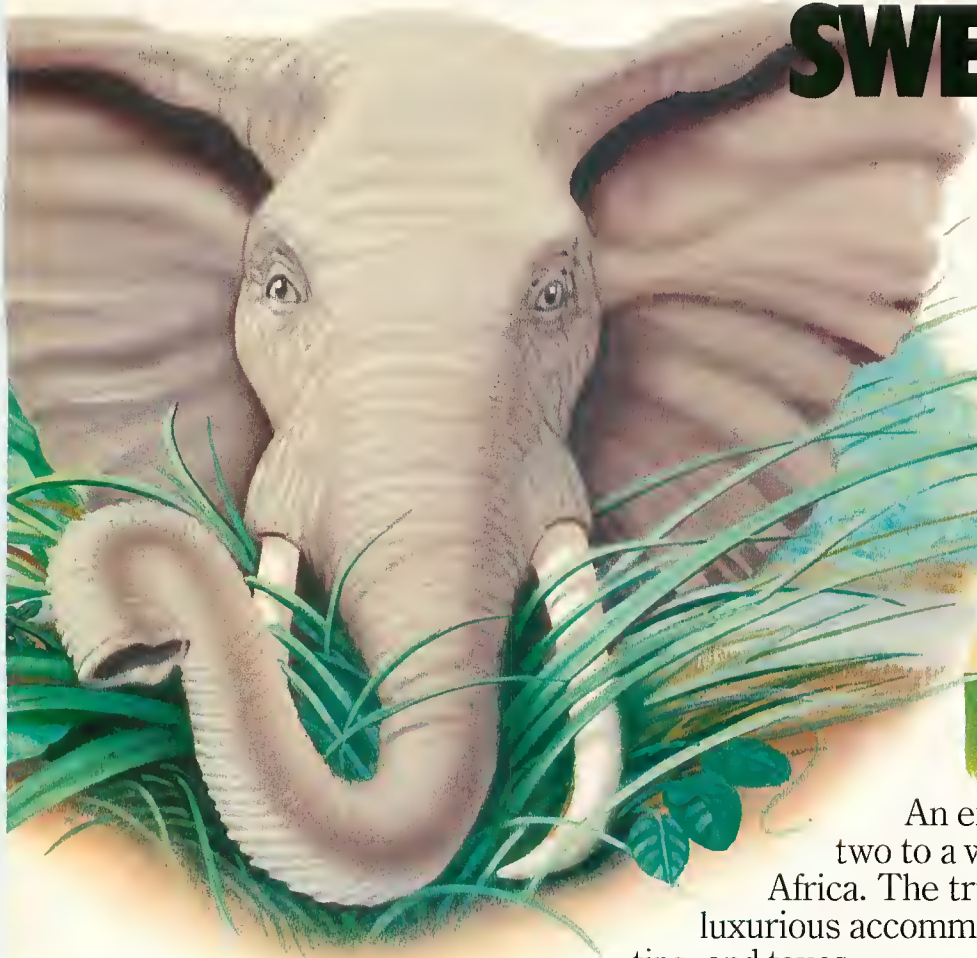
612024 RWE 1762K096 245L MAR85
A ROWEN
1762 KING JAMES PKY
OH 44145
WESTLAKE
07#6U



71486 02661

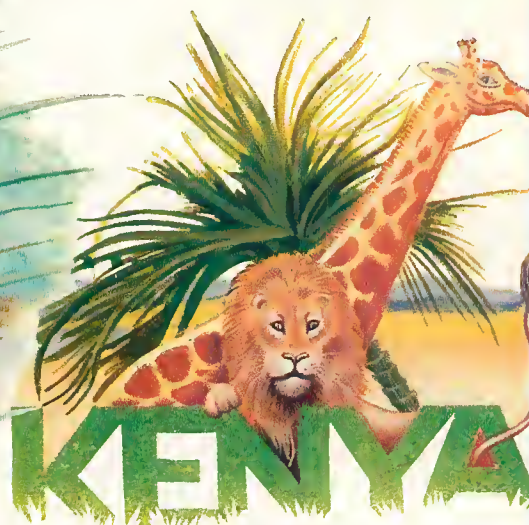
Tandy Corporation

ENTER THE ELEPHANT SAFARI™ SWEEPSTAKES.



GRAND PRIZE

(1 winner)



An exciting two week adventure for two to a wild game preserve in Kenya, Africa. The trip includes airfare, luxurious accommodations, meals, tips, and taxes.



SECOND PRIZE

(25 winners)

A Bell & Howell 35mm camera. The 35J complete with fine Lumina lens completely eliminates complicated focusing.



THIRD PRIZE

(100 winners)

Camouflage Nylon Duffel Bag. This handsome bag is water repellent and double reinforced at all stress points.

And thousands of Elephant Safari camouflage T-shirts featuring the Elephant logo.

Circle No. 23 on Reader Service Card

FIRST PRIZE

(5 winners)

A Deluxe Camping Package featuring an 8' x 10' Wenzel Cabin Tent, four Wenzel sleeping bags, plus a Coleman lantern, stove and cooler.



HOW TO ENTER

No purchase necessary. Just come into a participating Elephant Safari Sweepstakes dealership where you'll find free entry blanks and official rules. While you're there, check out our full line of quality Elephant memory disks and accompanying products. Entries must be received by July 31, 1984. Void where prohibited.



For the Elephant dealer nearest you, call 1-800-343-8413. In Massachusetts, call collect 617-769-8150.



Expands Your CoCo to CP/M

Circle No. 10 on Reader Service Card

WORKBASE



MORE THAN JUST A DATABASE

- CREATE
- UPDATE
- REORGANIZE

- SELECT AND SORT

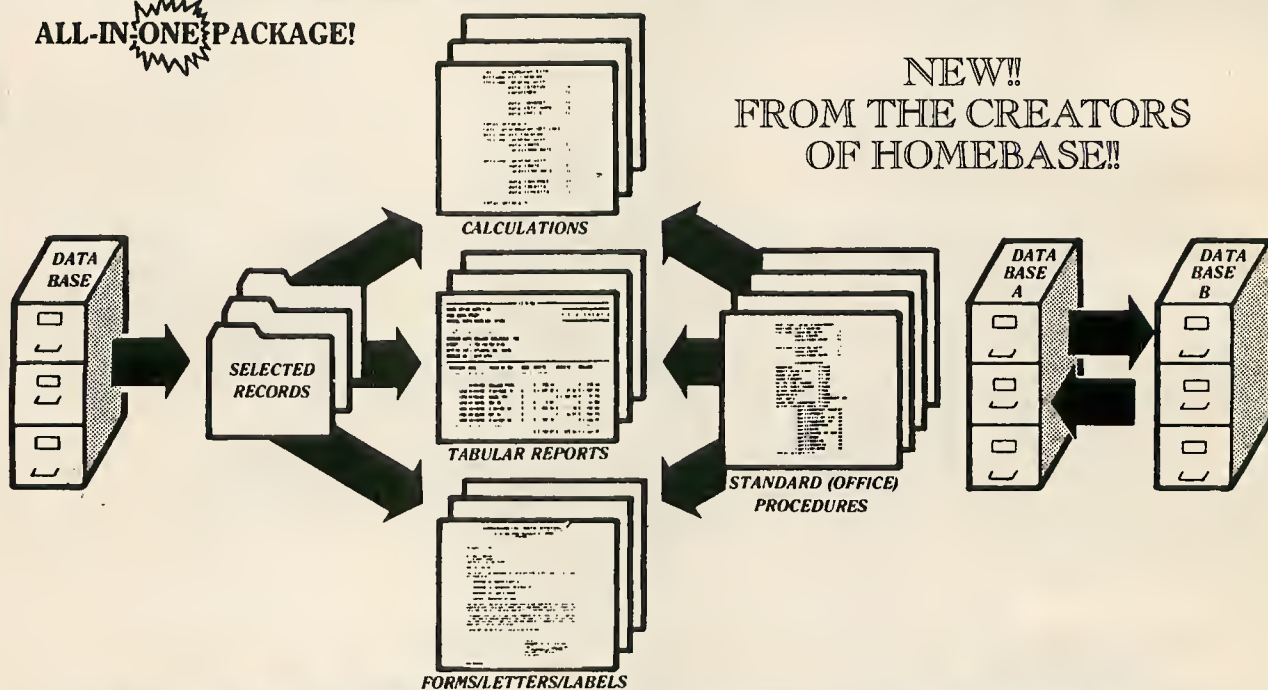
- CALCULATIONS
- REPORTS

- DEFINE AND SAVE CALCULATIONS

- MOVE DATA BETWEEN FILES

ALL-IN-ONE PACKAGE!

NEW!
FROM THE CREATORS
OF HOMEBASE!!



- CALCULATOR MODE
- ADD, DELETE, OR REARRANGE DATA FIELDS

- SORT ASCENDING OR DESCENDING
- SELECT OR SORT USING ANY DATA FIELD
- MULTIPLE SELECT MODES

- DEFINE SEVERAL CALCULATIONS OR REPORTS WITH SELECTION CRITERIA
- USE CALCULATION RESULTS AS SELECTION CRITERIA OR OTHER CALCULATIONS
- MERGE DATABASE WITH TEXT

- CHANGE SELECTION/CALCULATION VARIABLES OR ENTER DATA AT EXECUTION TIME
- LOAD & EXECUTE USING ANY FILE
- ALSO SAVE AND SORT SELECTION CRITERIA

- MERGE FILES OR RECORDS
- COPY FILES BACK-UP
- SEVERAL UTILITIES

WORKBASE™ DOES NOT REQUIRE PROGRAMMING, SPECIAL SOFTWARE, OR ANY HARDWARE MODIFICATIONS. WORKBASE™ COMES COMPLETE WITH MANUAL, TUTORIAL, DEMONSTRATION FILES, AND MASTER DISK

***** INTRODUCTORY PRICES *****

WORKBASE™ I \$64.95 400 RECORDS: REQUIRES 32K COLOR COMPUTER & 1 DISK DRIVE.

WORKBASE™ II \$79.95 1200 RECORDS: REQUIRES 32K COLOR COMPUTER & 2 DISK DRIVES.

*** PRICE INCLUDES SHIPPING & HANDLING WITHIN U.S.A. *** NC RESIDENTS ADD 4% SALES TAX. SHIPPED FROM STOCK WITHIN 24 HRS. ***

TO ORDER SEND CHECK OR MONEY ORDER TO:

CREDIT CARD ORDERS:
CALL TOLL FREE 1-800-334-0854 (EXT 887)
WITHIN NC CALL 1-800-672-0101 (EXT 887)

WORKBASE™ DATA SYSTEMS
P.O. BOX 3448
DURHAM, N.C. 27702

WORKBASE™ IS A TRADEMARK OF WORKBASE DATA SYSTEMS, A SUBSIDIARY OF SMALL BUSINESS SYSTEMS OF DURHAM, N.C. • 1 (919) 544-5408. TRS-80 IS A TRADEMARK OF TANDY CORP.

THE Color Computer[®] MAGAZINE

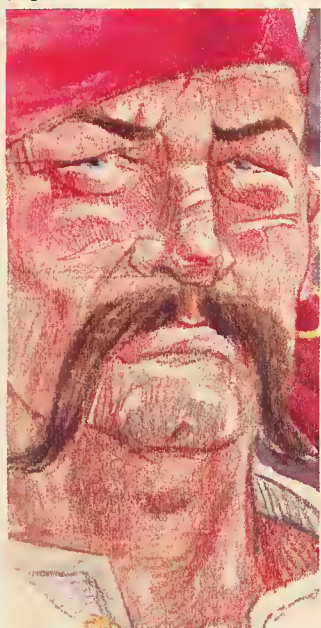
Vol. 2, No. 5
July 1984



page 22



page 60



page 76

FEATURES

- | | |
|----------------------------------------------------------------------------------------------------------------------|-------------|
| 22/On The Road To OS by E.M. Pass, Ph.D.
Looking at operating systems with hindsight and foresight. | (General) |
| 37/New Worlds Waiting by Eugene Grunby
CP/M is here! | (Review) |
| 42/Disk Encounters by Doug Kelley and Martin Goodman
Patches to kill bugs and create a new DOS experience. | (Utility) |
| 60/System Horizons by Stephen Allen
Studying the intersection of command and OS. | (Tutorial) |
| 69/Dissecting Your ROM by Jake Commander
The final parts. | (Utility) |
| 76/Color Computing For Kids by Jean Plessner
Piracy leaves none of us untouched. | (Education) |
| 83/More Summer Project Winners
Trap 'Em — the last winner! | (Game) |

DEPARTMENTS

4/PEEK (07,84)

4/FOR...NEXT (08,84)

8/INKEY\$

14/GOTO School by Dr. Paul Kimmelman

18/DEFUSR by Terry Kepner

90/On-Line by Terry Kepner

98/REVIEWS\$

Learning to Program in C, Option 4, Test Aid, Color Tutor, more!

112/NEW:PRODUCT\$

120/END OF FILE

Cover

"New Horizons" by Peter Macomber. Design by Spindler and Chase.

The Color Computer Magazine (ISSN 0736-9492) is published monthly for \$17.97 one year, \$31.97 for two years, \$43.97 for three years. Additional postage \$8.00 outside of continental U.S. Ziff-Davis Publishing Company, One Park Avenue, New York, NY 10016. President: Richard P. Friese; Secretary: Bertram A. Abrams; Treasurer: Selwyn Taubman. Second class postage paid at New York, NY and additional mailing offices. POSTMASTER: Send address changes to The Color Computer Magazine, P.O. Box 2599, Boulder, CO 80322.



n operating system is the program that creates the environment in which you operate your computer. Your computer comes with an operating system — you don't have to enter one via disk, tape or ROMpak — although alternative operating systems are available that can be entered via outside media. The operating system we think of most often is our Disk Operating System (DOS). Operating systems that must be specifically loaded are Flex, OS-9, Uniflex, and others.

Operating systems control how the hardware and memory in your computer use the commands you program into it. The historical background of this function comes from the mainframe days when a computer operator literally stood and threw switches on the computer's surface, acting as a human operating system. To understand how operating systems developed from that primitive form to the elegant programs they are today, GOTO 22, wherein Bud Pass presents an historical overview that will make you really appreciate your built-in system. Part two of Bud's overview will describe operating systems for the Color Computer.

How an operating system actually reacts to your command is nicely described by Stephen Allen. GOTO 60 to follow the List command through your system as it is processed.

Operating systems can be altered, permanently or temporarily, by the user. GOTO 42 for some patches to your Color Computer DOS — one will even correct an error in the original DOS.

Finally, GOTO 37 to read about a new product that will open up lots of heretofore untouchable software packages to Color Computer users. CP/M, a widespread standard operating system, is now available for our computer — and with its arrival, a lot of software will also be available.

Many of you have been begging us to provide you with Jake's computer disassembly faster than we have. We agree, it has been a long time coming. So — here's Jake's commentary to the rest of the disassembly, plus the disassembler and directions to use it — instant disassembly.

Jean Plesser has a special summer article for kids (GOTO 76). She discusses copyrights and piracy — important topics for us all, but especially for young programmers and users just getting involved with software.

And for some summer fun, GOTO 83 — Trap 'Em is the last in our series of Summer Project winners. Trap 'Em takes a quick hand and lots of guts to win.

Don't forget our regulars: GOTO 8 for INKEY\$, GOTO 14 for GOTO School, GOTO 18 for DEFUSR, GOTO 98 for Review\$, and GOTO 112 for New Product\$.

— D.M., Editor

FOR...NEXT(08,84)

AUGUST IS A GREAT time of year — the gardens are in full bloom, the beaches are a delight, and outside chores take up lots of our time. Our August issue will be a special review issue — all the great products available for the Color Computer that will fill your leisure time, help you out in your business and home, and make your computing time easier and more productive. See you then!

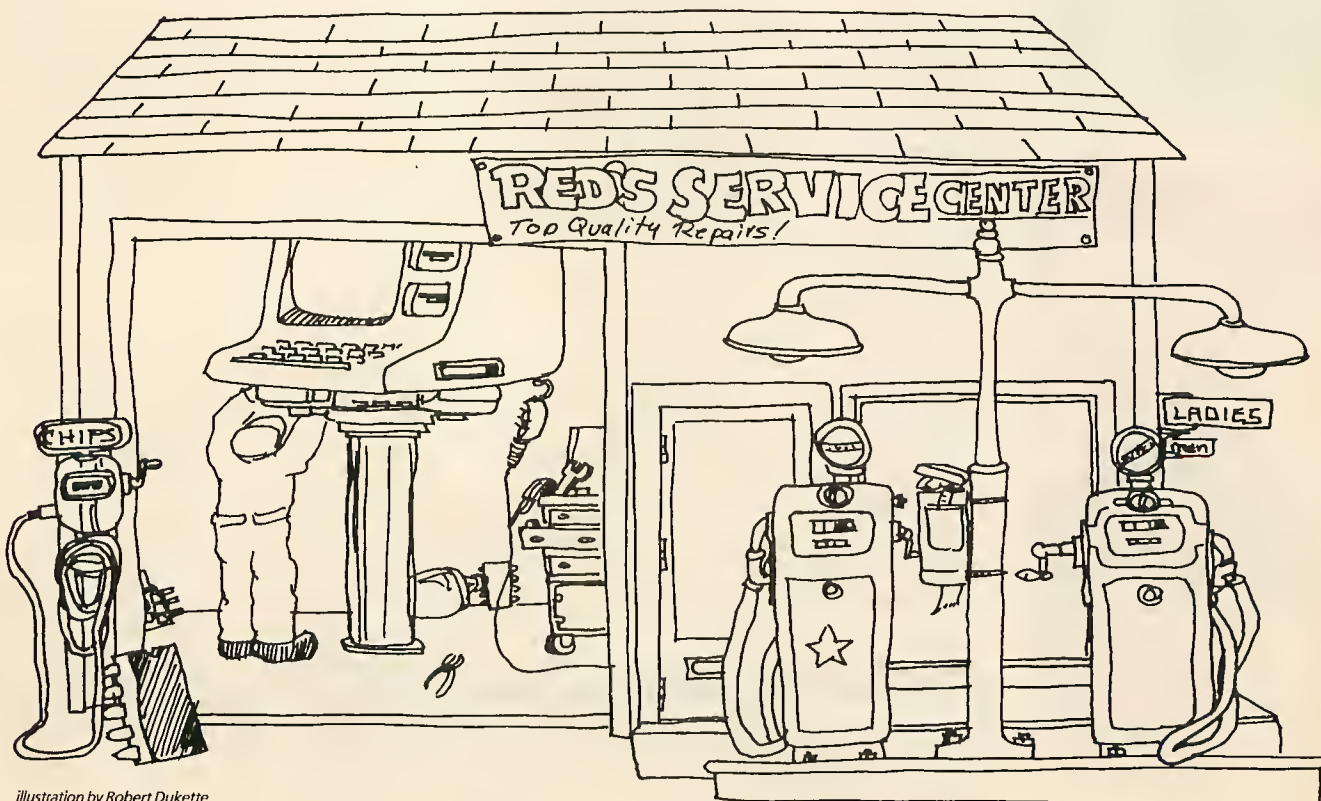


illustration by Robert Dukette

NEW! SENSATIONAL! GRAPHIC ADVENTURES

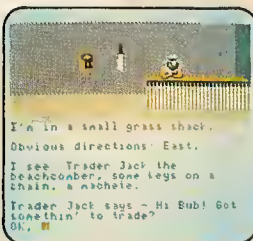
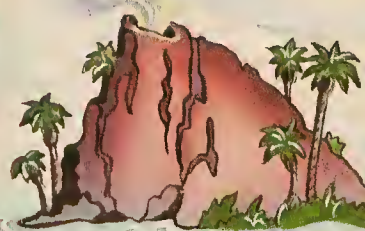
DISC NOT REQUIRED

Cassettes \$24.95 ea.
Discs \$27.95 ea.
32K Required



SHENANIGANS

From the heart of the city to lonely wilderness. An action filled journey to find the fabled pot of gold at the end of the rainbow. The first of our sensational new hi-res graphic adventures. You'll love it!



Actual photographs taken from Calixto Island screen.

CALIXTO ISLAND New Hi-Res Version

A challenging puzzle with an occasional twist of humor. You'll visit a secret laboratory, a Mayan pyramid and you'll meet crazy Trader Jack—all in living color and exciting detail. A classic!

BLACK SANCTUM New Hi-Res Version

Encounter the forces of black magic as you roam around an old 18th century monastery. You'll see all the evil locations in this spooky adventure in full hi-res detail. If you enjoy suspense, this one's for you.



SEA QUEST

Get your shark repellent and scuba tanks ready to search for treasures under the sea. You'll run into a pirate, a mermaid and hungry sharks in this colorful and unique adventure. Outstanding!

OTHER GREAT GAMES FROM MARK DATA

BUMPERS

Tension mounts as you wildly race through a hidden obstacle course. Barrier walls are invisible until you bump into them and you must proceed cautiously as each dead end has a hidden booby trap. Especially exciting when two players compete simultaneously.

COSMIC CLONES

Clonal Warriors, Super-Klones, Double Bombs and "the Death Layer" relentlessly challenge the most skillful player in this unique, fast action game. This is one of our favorites.

GLAXXONS

Pit your playing skill against squadrons of swooping, diving spacecraft. Fast and furious with seven selectable skill levels and automatic game acceleration... guaranteed to blister your joystick finger.

EL BANDITO

El Bandito has to be a crafty little hombre to stay alive as he loots the local countryside. Escape into a tunnel to avoid that angry spider... race around the corner towards your lair. Two players may compete simultaneously in this unusual game.

All games: Cassettes ... \$24.95 ea. Discs ... \$27.95 ea. 16K Required



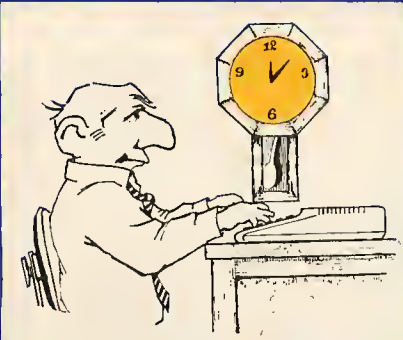
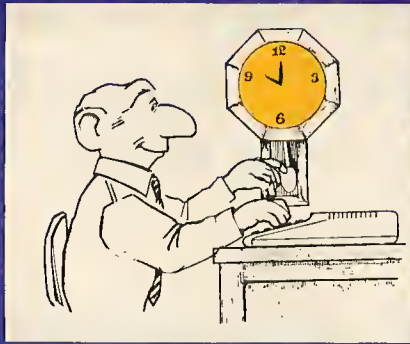
Mark Data Products

24001 Alicia Pkwy., #207, Mission Viejo, CA 92691 • (714) 768-1551

ORDERING INFORMATION: Phone your order for speedy delivery. Use your MasterCard or Visa. We also accept checks and money orders. ALL ORDERS: Please add \$2.00 shipping and handling in the continental U.S. All others, add air shipping and \$3.00 handling. California residents add 6% sales tax. Foreign orders please remit U.S. funds. Distributed in Canada by Kelly Software Distributors. SOFTWARE AUTHORS: Contact us for exciting marketing details.

Circle No. 71 on Reader Service Card

LOAD TAPE Adventures



There are, after all, better ways to
spend a day.

I can think of half a dozen things I'd rather do than type all day. Please send me the tapes for the months I've listed below.

☐ MC ☐ VISA
Account # _____

Exp. _____

Or send check
or money order

Name _____

Address _____

074

MAIL TO: _____ Zip _____

The Color Computer Magazine Tapes
Highland Mill, Camden, ME 04843

*March & April are combined. CC Space Trek and Banner Program not included.

ISSUE*	QTY.	PRICE	S & H EA.	TOTAL
		\$9.95	\$1.50	
		\$9.95	\$1.50	
		\$9.95	\$1.50	
		\$9.95	\$1.50	
1-YEAR SUBSCRIPTION \$99.95 (S & H INCL.)				

THE Color Computer... MAGAZINE

Editorial

Editor-in-Chief KERRY LEIGHTMAN
Editor DEBRA MARSHALL
Managing Editor LYNN ROGNSVOOG
Technical Editor JAMIE TIETJEN
Review Editor TOM JUERGENS
Assistant Editor ANN HAWKS
Contributing Editors WILLIAM BARDEN JR.
JAKE COMMANDER
DENNIS KITSZ
STEVE BJORK
Information Editor TERRY KEPNER
Education Editors DR. PAUL KIMMELMAN
DAVID MACALI, REVIEWS
Communications Editor WAYNE DAY
Technical Consultants PAUL DETWILER
STEVE ODNEAL
Operations Manager BONNIE HELLEVIG
Office Manager KRISTI KING

Art & Production

Art Director SUSAN CRAMER
Ass't Art Director J.L. PATTERSON
Art Editor ROD MCCORMICK

Advertising Sales

Director of Advertising: DAVID EZEQUELLE
Advertising Coordinator: HOLLY COOPERSTEIN
Account Manager: ROBERT ETTENSON, MICHAEL FEDERLE

Circulation

Subscription Director: CHET KLIMUSZKO
New Business Manager: ERIC A. BERNHARD
Renewal and Billing Manager: SHANE BOEL
Telemarketing Manager: LINDA ROSSITER

Consumer Computers & Electronics Magazine Division

President: LARRY SPORN
Vice President, Publishing Director: J. SCOTT BRIGGS
Vice President, Circulation: CAROLE MANDEL
Vice President, General Manager: EILEEN G. MARKOWITZ
Vice President, Licensing and Special Projects: JERRY SCHNEIDER
Vice President, Creative: HERBERT STERN
Creative Director: PETER J. BLANK
Editorial Director: JONATHAN D. LAZARUS
Marketing Manager: RONNI SONNENBERG

Ziff-Davis Publishing

President, RICHARD P. FRIESE; **President, Consumer Magazine Division,** ALBERT S. TRAINA; **Executive Vice President, Marketing and Circulation,** PAUL H. CHOOK; **Senior Vice President,** SIDNEY HOLTZ; **Senior Vice President,** EDWARD D. MUELFELD; **Senior Vice President,** PHILIP SINE; **Vice President,** BAIRD DAVIS; **Vice President,** GEORGE MORRISSEY; **Vice President,** RORY PARIS; **Vice President,** WILLIAM L. PHILIPS; **Treasurer,** SELWYN TAUBMAN; **Secretary,** BERTRAM A. ABRAMS

The Color Computer Magazine (ISSN 0736-9492) is published monthly for \$17.97 one year, \$31.97 for two years, \$43.97 for three years. Additional postage \$8.00 outside of continental U.S. Ziff-Davis Publishing Company, One Park Avenue, New York, NY 10016. Second class postage paid at New York, NY and additional mailing offices. POSTMASTER: Send address changes to The Color Computer Magazine, P.O. Box 2599, Boulder, CO 80322.

Editorial and Advertising Offices: The Color Computer Magazine, Highland Mill, Camden, Maine 04843 (207) 236-9621, and One Park Avenue, New York, NY 10016 (212) 725-3500. Business offices: Ziff-Davis Publishing Company, One Park Avenue, New York, NY 10016.

Permissions: Material in this publication may not be reproduced in any form without permission. Requests should be directed to Elizabeth Amado, Ziff-Davis Publishing Company, One Park Avenue, New York, NY 10016.

The Color Computer Magazine is an independent publication, not affiliated in any way with Tandy Corporation. TRS-80 and Color Computer are registered trademarks of the Radio Shack division of Tandy Corporation. Entire contents Copyright © 1984 Ziff-Davis Publishing Company. All rights reserved; reproduction in whole or in part without permission is prohibited.

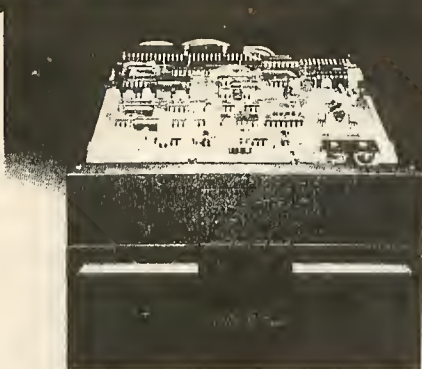
U.S.A. newsstand distribution by Curtis Circulation Company.

DISK DRIVES

STARTING AT

\$159.00

**WITH CASE &
POWER SUPPLY**
\$189.95



TANDON MPI TEAC

Speed 5ms tk to tk and up
Capacity 250k unformatted
Tracks 40
Warranty 6 months

ORDER TOLL FREE!
1-800-635-0300



Even more savings!!

ALL DRIVES FULLY TESTED & WARRANTED.

Complete Disk Drive with Power Supply & Case	\$189.95
Two Drives in Dual Case & Power Supply	\$359.00
1/2 ht double sided double density Disk Drives (Panasonic)	\$219.95
1/2 ht double sided double density Disk Drive with ps & case	\$249.95
2 double sided double density drives with ps & case	\$489.95
Single ps & case	\$39.95

Color Computer Controller

Supports double sided double density drives
with 1 year warranty and manual. \$139.95

Ask about our 3way Color Computer Drive Kits

Complete with Diskettes	starting at \$329.95
Diskettes with FREE library case	\$19.95
Head Cleaner Kits	\$Call
Unadvertised Specials	\$Call
Drives cleaned, aligned & tested	\$29.95



TECHNICAL STAFF ON DUTY, PLEASE CALL FOR ASSISTANCE.

CALL US TODAY!!

(617) 234-7047

* DEALER INQUIRIES INVITED.



TRUE DATA PRODUCTS

195 Linwood Street, P.O. Box 546

Linwood, Massachusetts 01525

(617) 234-7047

HOURS MON-SAT 9-6 (EST)

We welcome

- Visa / Master Charge
- Checks (allow 2 weeks for clearing)
- C.O.D. Add \$2.00

All letters are subject to editing for space considerations.



INKEY\$

The Color Computer Magazine
Highland Mill
Camden, ME 04843

Different Machines

I have recently heard that the DMP-100, Gorilla Banana, and the VIC-20 1525 printer are all made by the same company. Why should I pay the price of \$250 for the DMP-100 or Gorilla Banana when I can obtain the VIC-20 1525 for only \$199? If I purchased this printer, should I expect any problems with graphics or text? Also, can I obtain the new Color Computer's keyboard from Radio Shack?

In the December issue of **The Color Computer Magazine** there's an error in Dennis Kitz's "Custom Color." It's on page 98 under Listing 4. Line 70 should read: 70 FOR Y = X TO X+ 52 STEP 4: POKE Y,Z.

Jeff Sauer
Perkiomenville, PA

Jeff, the VIC-20 1525 may be made by the manufacturer of DMP-100s and Gorilla Bananas, but it is not the same. It has only a serial version of the GPIB interface; neither the Color Computer's RS-232 serial interface nor the Centronics parallel are directly compatible. You'd easily spend the difference in price on an interface converter.

— Eds.

Battered Mags

I just received my February issue of your magazine and wondered if you could send me the addresses of the pre-finalists. I want to write some of them for a listing of their programs or maybe you could send or publish some of the listings.

I also have a small complaint. Several issues of **The Color Computer Magazine** have arrived pretty battered. The worst was my February issue whose cover was ripped and separated from the magazine, and part of the **TCCM** logo was missing! I don't understand why your magazine occasionally arrives this way when the other computer magazines we subscribe to arrive in nearly perfect condition most of the time.

Ricardo J. Bascuas
Miami, FL

1. We are currently making arrangements to publish some of the finalists' games.
2. It seems postal equipment finds magazine ink and paper to be nutritious. For some reason the machinery found our February cover to be more delicious than others. As of the April issue we switched our mailing location. Hopefully the new post office has better trained machines.

— Eds.

More On The OS/9

The article on OS/9 by Norman Garrett (March, 1984) is well written and very informative. It gives a good overall description of the OS/9 operating system. I came across one detail, however, which is a bit misleading.

In the "Using Assembly Language" section of the article, Norman mentions the OS/9 macro assembler and many documented macros available. I wish to clarify those terms.

The OS/9 assembler is not a true macro assembler. It does not recognize the MACRO di-

rective; therefore, it does not allow the programmer to create and reference new macros. The OS/9 directive is the only macro which the assembler uses.

The "macros" the article refers to are really system service calls to the OS/9 operating system supported through the use of software interrupts. The code to perform them is not present in the user program. In the case of user defined/referenced macros, the code for the macro is expanded into the program code during assembly, so every macro reference generates all code needed to perform that function.

I have the first release of Color Computer OS/9. I am unaware of any updates since then. If there is one which includes a real macro assembler, I would like to know. (I realize there are other commercial assemblers available.)

Curtis A. Whitley
Chesapeake, VA

No Defense

I recently typed "Defense," a program listed in the December issue of **The Color Computer Magazine** into my computer, and found there is no part of the program that looks like the picture displayed on page 73. Am I right or is there a program error? If there isn't a screen of this type, I feel it is very misleading to have this picture in the midst of the text. I felt I wasted several hours of effort since the program was not the one I expected.

A concerned reader and tired typist.

Tim McCaughan
Evanston, IL

We goofed. The screen display that we thought was from "Defense" isn't. In fact, we aren't sure where that screen came from! Any takers out there?

— Eds.

SPAZMORG

As a retired electronics engineer, I have been enjoying my TRS-80 Color Computer for

nearly three years and **The Color Computer Magazine** since it first came out. I have been very happy with the magazine, but would like to comment on your game contest Basic Grand Prize winner, "Spazmorg."

The game has great graphics and sound effects, good instructions, and originality of game concept, but there it ends. If logic, strategy or skill are required I could not see it.

One could prolong the game by retreating quickly from the spider's den. Otherwise you went from room to room until you found the baby, then followed him until you were eaten by his mother or by the spider — or until he entered a room with no other doors open, which allowed you to catch him and win. You could never catch the little bugger if any doors were open.

I could win about every fifth or sixth game. It seemed the game was controlled purely randomly and no skill on my part could change it. Maybe I missed something. I hope so.

Thank you for a good publication.

Floyd Keirnan
Orange, CA

When I wrote "Spazmorg," I wanted a graphic game with more meat in it than the average shoot-'em-up game. It had to look good and offer more challenge than to see how fast one could move a joystick and push a button. "Where's the beef?" Mr. Keirnan asks. Let me explain.

Mr. Keirnan's problem was in his approach to the game. His strategy was to chase the baby Spazmorg from room to room hoping to catch it. Well, that's one way to play, but it lacks fun. You die a lot, and win with fairly bad scores.

It's not a chase game. The object is to trap the Spazmorg. He's faster than you, so you have to outsmart him by forcing him into a room from which he can't escape.

This is hard since the player can only see one room at a time. The challenge is to visualize all nine rooms and 12 doors in your mind, then plot the logical moves to trap him. Remember, you control the doors.

Many other hazards present problems and decisions. Regaining your bearings when hit by a wind is one. Remembering which room the spider is in after finding him is another. All these factors have rational moves the player can take in dealing with them. He has to use memory and better judgement.

As in adventure gaming, it takes time to learn the tricks. When experience increases and skill develops, the player will find himself winning five out of six games, and with good scores. The words logic and skill were not used without reason. I encourage Mr. Keirnan to try again. There are ways to beat the Spazmorg.

Al Bogdan

TIMS Revisited

We were, for the most part, pleased with your review of the Tape Information Management System (TIMS) in the January, 1984 issue of **The Color Computer Magazine**. I would like to clarify a few errors, however.

TIMS is fully disk-compatible. All you have to do is SKIPF over the auto run loader, CLOAD and SAVE "TIMS". TIMS has been simple to move to disk for several reasons: our present customers do not have to purchase an upgrade or disk version when they purchase a disk system — they can continue to use the program they have; future customers can purchase and use TIMS regardless of the system (tape or disk) they have; and this disk compatible feature is part of our "user-oriented, menu-driven, easy to use" claim. When TIMS is loaded from disk, the program can read in from either disk or tape and save to either disk or tape. Also, there is a facility for defining and storing report formats. The formatted file can be sent to tape, disk or printer. You can then use a word processor on your TIMS file to be even more creative with the file than the flexible formatting features allow.

Finally, although TIMS can be used with 16K, we recom-

mend 32K because files can be so much larger. We have had good experience with some 64K programs, which have allowed us to create even larger files.

Susan P. Davis
Sugar Software

Susan Davis' letter has prompted me to re-examine TIMS. I agree with her (well, sort of) on one point, but I'm afraid we still differ on another.

First, the disagreement: disk compatibility. Each side of the TIMS tape contains a Basic program that handles most of the work, followed by a machine language file — the sorting routine, I believe. In addition, side A (which contains the "compressed" version of the Basic code) leads off with Sugar Software's Auto-Run loader routine. Ms. Davis rightly points out that you can skip over this with a SKIPF command (SKIPF "TIMS", actually then CLOAD the main program and save it to disk. The problem remains of what to do with the machine language file.

In normal operation the cassette deck is left in Play mode when TIMS is run; the program loads the machine language portion itself. For disk operation, then, you have to copy this second file and change a Basic command or two. The Basic code reveals that the machine language is stored on tape with the file name SSBDM, and should be saved with the three addresses. They are 15734, 16383, and 15734 (at least for 16K operation). Changing a CLOADM and a SAVEM in the code to a LOADM and a SAVEM, and saving SSBDM on disk, will indeed result in a pair of routines that run without reference to the tape.

However, the program still wants to read and write cassette data files! Additional surgery on the code would fix that, but that's not what I call disk compatibility. I suspect Ms. Davis also has something else in mind, and I'd welcome her comments. I may have an outdated version.

On to the second topic — when I said TIMS does not permit user-defined report format

storage, I was thinking of formats that are stored separately from the data. Ms. Davis rightly points out that TIMS incorporates the most recent format definition in the header of the data file when it is recorded on tape. Thus you can set up multiple reports — you just have to re-record your data file for each one. The technique uses up a little tape, but it works. I should have caught that.

Scott L. Norman
Framingham, MA

Graphic Pak Incompatibility

After reading the review of Radio Shack's "Graphic Pak" in the February, 1984 issue of **The Color Computer Magazine** I thought I'd add information about the program.

I have 32K and a Radio Shack DMP-120 printer. After purchasing the graphic program, I had problems getting a print-out of the results. I got in touch with the salesman who sold me the printer. He said the program would not work with the 120 but would with the DMP-200. I was unhappy about that.

My money was refunded, but I would buy the program again if Radio Shack made it compatible with their new printers.

Cruncher Bug

I have discovered a bug in the article "Cruncher" by William Harris, published in **The Color Computer Magazine** (January, 1984). I have "killed" this bug. As an example, if my original Basic program has 20 PRINT " Place a formatted Disk in Drive " DR " , And press <ENTER>

The Screen Print Program and PTFX16K program would not work either.

I have been very happy with the DMP-120 and it seems to work very well, but I would like to be able to use its graphics capabilities.

Jeffrey W. Wilson
Midland, TX

Color-80 BBS Comments

I would like to comment on the review of our Color-80 BBS in the April, 1984 issue of **The Color Computer Magazine**. The review says the system is an upgrade of earlier versions. In fact, we wrote it from scratch. It also says the system's database supports up- and down-loading. The database is just a list of files: it's the file transfer section that does the up- and down-loading.

Also, the bulletin board's operating system source code is not only "not included" in the documentation, as your reviewer pointed out — it isn't even offered. Regarding modems, the review mentions only two that can be used, when actually others are compatible as well.

Shawn Jipp
Silicon Rainbow Products
Sunnyvale, CA

and if I crunch the program with the Cruncher as is, Line 20 will be:

20 INPUT " Place a formatted Disk in Drive "DR.
The remaining text will be eaten up.

To kill the bug, change Lines 1320 and 1420 as in the Program Listing, add Lines 1321, 1322, 1421, 1422 to it and reassemble the Cruncher (below).

1320	CNUM	CMPA # \$22	QUOTE ?
1321		BEQ GETSTR	GET STRING
1322		BSR NUMCHK	CHECK FOR NO.
1420		CMPA # \$22	QUOTE
1421		BEQ GETSTR	
1422		BSR SPTEST	

Ashok Basargekar
Orange, CA

PROFESSIONAL PROFESSIONAL PROFESSIONAL PROFESSIONAL

P
R
O
F
E
S
S
I
O
N
A
L

P
R
O
F
E
S
S
I
O
N
A
L

REAL EIGHTY-COLUMN DISPLAY!

ULTRA TERM +

Works with either the WORD-PAK from PBJ or
Color Power II CP|M unit from Color Power Unlimited.
Specify WORD-PAK or Color Power when ordering.

PROFESSIONAL PROFESSIONAL PROFESSIONAL PROFESSIONAL

This program is the **ultimate** in coco communicating!! **Ultra Term +** is used with a plug-in 80 column board* that gives you **True** 80 columns, not the graphics display that is unreadable at 80 columns. This is truly a **Professional** Package that is so easy to use that once you have used it, you'll wonder why other packages are so difficult to use, (except for Color Term + Plus + that is!) After using a terminal program that cannot give you **True** mainframe terminal emulation, you will find **Ultra Term +** indispensable! **Ultra Term +** even has a host mode that allows you to echo characters like full duplex mainframes do! There are also 10 macro keys which will allow you to save passwords, phone numbers, modem programming information, etc. + PLUS + you can save them to tape (Rom Pack, Tape Versions) or disk (Disk Version). Also, like all **Professional** terminal programs you can save your current parameters. This saves you set up time when moving from one system to another. + Plus + when used with the parallel printer port** you can print either what is coming in, or print what you saved in your space buffer (64K systems only support the space buffer option) if you like. And what about documentation? Every feature is explained in detail and indexed for fast look up! There is also a comprehensive help section to aid those unfamiliar with telecommunications. Although this program was designed for the Professional a total novice can use it with ease. Check all the features listed below and then you decide who has the world's smartest terminal!

Baud Rates: 110-4800 (communicate)
600-9600 (printer).

Screen Format: 80 x 25 w/true upper & lower case.

Select half, full duplex or echo.

Select odd, even, mark, space or no parity.

Select all 128 characters from keyboard.

Select 7 or 8 bit words.

Select 1 or 2 stop bits.

Select a true line break.

Select all caps if needed.

Automatic capture of incoming files.

X on/X off capabilities.

Merge text or programs in buffer.

53,000 character buffer (64K).

Split buffer option (64K).

10 macro keys.

Four buffer send modes (dump, prompted, manual & time delay).

Buffer size indicators (bytes used & bytes remaining).

Buffer editor w/auto key repeat.

Scroll forward & reverse to view buffer & print viewed screen option.

Selectable printer formats (line feeds, etc.).

Selectable trapping of incoming characters.

Print while receiving data*.

Spool received data while receiving more (64K).

Buffer editor has these features:

Move forward and reverse through buffer. Insert, type over, delete lines or characters.

Block deletion or start to end of buffer delete.

Save and load macros.

Save and load parameters.

Use 1-4 disk drive (w/SAVE, LOAD, DIR. & granule display).

Easy to use MENU driven format.

Comprehensive users manual.

Works with **ALL** Radio Shack™ Disk Systems and **all** models of color computers.

Still not convinced? How about a 15 day, money back guarantee? If you don't like the package for any reason, we will refund your money upon return of a like-new package.† Who out there is offering

you this kind of deal? And customer support was never better. Simply fill out your registration card and send it back to us and you will be notified when new features, improvements, etc. become available because all registered owners will receive **Free** upgrades for a \$5.00 shipping and handling fee).

As with all good Professional programs, **Ultra Term +** is all machine code. This program has been tested by those both familiar and unfamiliar with communications programs. And when you call for some technical support, you **won't** get an answering machine during our business hours (10-5 CST M-Sat.) under normal circumstances. Technical help is usually available all day.

Note: Color Term + PLUS + should have all of the same capabilities described above by the time you read this ad, but call first to make sure. **Ultra Term +** is ready to ship **now**.

PRICE: Ultra Term + — \$55.95
(Disk/Tape)

Color Term + Plus + (V5.0)
\$45.95 (Disk/Tape)

Word-Pak (Includes a software driver so you can use your basic programs with no modification in most cases!)...\$139.95 + \$3.00 S&H

Y-Cable...\$29.95 (Required if expansion port not used with disk drives)

Complete Package **Ultra Term +**, Word-Pak & Y Cable [subtract \$20.00 if not needed] is only **\$210.00**

***Ultra Term +** supports the 80 column board made by PBJ, Inc. If you already have the board, simply order the program, but those of you who don't can get a good deal.

**Parallel Printer Port from PBJ, Inc.

†Less \$10.00 restocking charge.

Canadians
Kelly Software Distributors Ltd.
P.O. Box 11932
Edmonton, Alberta.
(403) 421-8003



Double Density Software
920 Baldwin Street
Denton, Texas 76201
Phone 817/566-2004.



Clubs

Georgia Club

For information on the Color Computer Users' Club in Savannah-Hinesville, GA contact William Mason, 417 Timberlane Circle, Savannah-Hinesville, GA 31313 or call (912)368-3900.

Gainesville, FL

Alachua Color Computer Users' Group will meet on the second Tuesday each month at 7 p.m. at the Operations Center behind the Kelly Power Plant at 555 S.E. 5th Ave., Gainesville, FL. For more information contact: Al Kirk at 4617 S.E. 2nd Pl., Gainesville, FL, 32601 or call (904)377-6285. George McDonald may be contacted at Rt. 2, Box 530, Alachua, FL 32615, or call (904)462-5392.

Jefferson City, MO

A Color Computer Users' Group is forming in the Jefferson City/mid-Missouri area. For more information write: CoCo Mug, c/o Wayne Johnson, 900 Rock Hill Rd., Jefferson City, MO 65101 or call (314)893-2789.

NY Club

Call (518)644-9927 for information on the Adirondack Color Computer Club.

Illinois Club

The Northern Illinois Color Computer Club (NICCC) meets every fourth Tuesday at Des Plaines Public Library. For more information write Rich Ekstrom, 580 Milton Lane, Hoffman Estates, IL 60194 or call (312)885-2573.

Boston, MA

The Greater Boston Super Color Users' Group meets every second Thursday at Sylvania Technical School, 63 Second Ave., Waltham, MA. The users' group publishes a monthly newsletter, The SCUGBUG. Color Computer users may contact John DeBay, 100 Central Street, Waltham, MA 02154 for more information.

Fix(05,84)

EPROM Burner Fix

The "EPROM Programmer" schematic (page 32) should include a connection from pin 16 of the ETM socket to +5 volts. The Darlington transistor should be labeled as an NPN type.

Fix(04,84)

Disk Editor Fix

In "Devil's Disk Editor" (page 106) Line 680 should be changed to 680 T = INT(FT/2): S = (1 AND FT) * 9 + 1: IF T > 16 THEN T = T + 1

Fix(03,84)

Cashbook Fix

In the "Cashbook" program (page 35) Line 7050 should have a space between variable C2 and THEN.

Speller Fix

The article "Speller" mistakenly directs the reader to press Enter to enter the file set-up (word entry) mode. To use this mode, answer the name question with ENTER. If you like the directions as printed, you may omit the word ENTER from Line 50, but leave the double quotes there (with nothing in between).

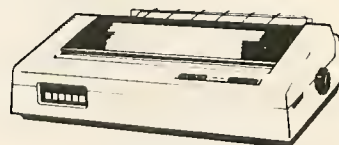
Fixes

TRS - 80 COMPUTER DISCOUNTS



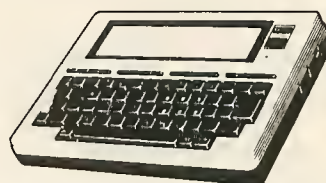
COLOR COMPUTERS

26-3026 16k color II	139.95
26-3027 16k ext color II	169.95
26-3127 64k color comp II	210.00
26-3022 1st disk drive	329.95
26-3023 2nd disk drive	229.95



PRINTERS

26-1271 DMP-110	299.95
26-1254 DMP-200	510.00
26-1255 DMP-120	395.00
26-1257 DWP-210	629.95



MODEL 4 and 100's

26-1067 mod 4 16k	829.95
26-1069 mod 4 64K 2 dr.	1695.00
26-3801 mod 100 8 k	699.95
26-3802 mod 100 24k	839.95

**WE CARRY THE COMPLETE LINE OF
TRS-80 COMPUTER PRODUCTS
AT DISCOUNT PRICES**

**CALL FOR
FREE PRICE LIST**

800-257-5556

in N.J. 609-769-0551

Woodstown Electronics

Route 40 E. Woodstown, N.J. 08098

VIP Writer™

(Formerly Super "Color" Writer II)
By Tim Nelson

Includes
VIP Speller
at no
additional
cost!!

RATED TOPS IN RAINBOW, HOT COCO, COLOR COMPUTER MAGAZINE & COLOR COMPUTER WEEKLY

The most powerful and easy-to-use word processor is available in the showpiece and workhorse of the **Library: The VIP Writer™**. Because of its undisputed superiority over all Color Computer word processors, it was selected by Dragon Data Ltd. of England and TANO in the U.S., to be the Official Word Processor for their line of Dragon microcomputers.

The result of two years of research, the **VIP Writer™** offers every feature you could desire from a word processor. It is the most powerful, fastest, most dependable and most versatile. With the hi-res display, workspace and compatibility features built into the **Library** the **Writer** is also the most usable.

"... Nearly every feature and option possible to implement on the Color Computer. The design of the program is excellent; the programming is flawless... Features for the professional, yet it is easy enough for newcomers to master... Certainly one of the best word processors available for any computer..." October 1983 "Rainbow"

"Word processing with VIP Writer is like driving a high-performance vehicle... This Ferrari of a package has more features than Telewriter, Easywriter (for the IBM PC), or Applewriter." October 1983 "Hot CoCo"

The **Writer** will work with you and your printer to do things you always wanted to do. Every feature of your printer can be put to use, every character set, every graphics capability at any baud rate, EVEN PROPORTIONAL SPACING. All this with simplicity and elegance. You can even automatically print multiple copies.

Although all versions feature tape save and load, the disk version provides the Mini Disk Operating System common to the whole **Library**, plus disk file linking for continuous printing.

Professional features of particular note:

- Memory-Sense with **BANK SWITCHING** to fully utilize 64K, giving not just 24 or 30K, but up to 61K of workspace with the rompak version and 50K with the disk version.
- TRUE FORMAT WINDOW allowing you to preview the printed page ON THE SCREEN BEFORE PRINTING, showing centered lines, headers, FOOTNOTES, page breaks, page numbers, & margins in line lengths of up to 240 characters. It makes HYPHENATION a snap.
- A TRUE EDITING WINDOW in all 9 display modes for those extra wide reports and graphs (up to 240 columns!).
- FREEDOM to imbed any number of PRINTER CONTROL CODES anywhere, EVEN WITHIN JUSTIFIED TEXT.
- Full 4-way cursor control, sophisticated edit commands, the ability to edit any BASIC program or ASCII textfile, SEVEN DELETE FUNCTIONS, LINE INSERT, LOCATE AND CHANGE, wild card locate, up to TEN SIMULTANEOUS block manipulations, word wrap around, programmable tabs, display memory used and left, non-breakable space, and headers, footers and FOOTNOTES.
- Automatic justification, automatic pagination, automatic centering, automatic flush right, underlining, superscripts, subscripts, pause print, single-sheet pause, and print comments.
- Type-ahead, typamatic key repeat and key beep for the pros, ERROR DETECTION and UNDO MISTAKE features, 3 PROGRAMMABLE functions, auto column creation, and an instant on-screen HELP TABLE.

32K (Comes with tape & disk) \$59.95

(Includes VIP Speller)

VIP Speller™

WITH A 50,000 WORD INDEXED DICTIONARY!

By Bill Argyros

Gone are the eyestrain, boredom and fatigue from endless proof-reading. **VIP Speller™** is the fastest and most user-friendly speller for your CoCo. It can be used to correct any ASCII file — including **VIP Library™** files and files from **Scipsit™** and **Telewriter™**. It automatically checks files for words to be corrected, marked for special attention or even added to the dictionary. You can even view the word in context, with upper and lowercase. **VIP Speller™** comes with a specially edited 60,000 word dictionary which, unlike other spellers for the CoCo, is indexed for the greatest speed. The shorter your file, the quicker the checking time. And words can be added to or deleted from the dictionary or you can create one of your own. **VIP Speller™** also comes with the **Library's** mini disk operating system for easy disk manipulation.

32K DISK ONLY \$39.95

Lowercase displays not available with this program.



VIP Calc™

(Formerly Super "Color" Calc)

By Kevin Herrboldt

You can forget the other toy calcs — The real thing is here! No other spreadsheet for the Color Computer gives you:

- 20 ROWS BY 9 COLUMNS ON THE SCREEN AT ONCE
- LOWERCASE LETTERS WITH DESCENDERS
- UP TO 16 CONCURRENT DISPLAY WINDOWS
- FLOATING-POINT MATH
- CHOICE OF SINGLE AND DOUBLE PRECISION
- WORKS WITH BASE 2, 10, AND 16 NUMBERS
- UP TO 512 COLUMNS BY 1024 ROWS
- USER DEFINABLE WORKSHEET SIZE FOR MORE MEMORY
- LOCATE FUNCTION TO FIND CHECK NUMBERS, NAMES, ETC.
- COLUMN/ROW MULTIPLE SORTS
- PROGRAMMABLE FUNCTIONS
- IMBEDDABLE PRINTER CONTROL CODES
- 21 ALTERABLE PRINT FORMAT PARAMETERS
- ON-LINE HELP TABLES
- DOES NOT REQUIRE FLEX OR BASIC

VIP Calc™ is truly the finest and easily the most powerful electronic worksheet and financial modeling program available for the Color Computer. Now every Color Computer owner has access to a calculating and planning tool better than VisiCalc™, containing all its features and commands and then some, WITH USABLE DISPLAYS. Use VisiCalc templates with **VIP Calc™**!

There's nothing left out of **VIP Calc™**. Every feature you've come to rely on with VisiCalc™ is there, and then some. You get up to 5 TIMES the screen display area of other spreadsheets for the Color Computer and Memory-Sense with **BANK SWITCHING** to give not just 24, or 30, but UP TO 33K OF WORKSPACE IN 64K!!! This display and memory allow you the FULL SIZE, USABLE WORKSHEETS you require. You also get: User definable worksheet size, up to 512 columns by 1024 rows! * Up to SIXTEEN VIDEO DISPLAY WINDOWS to compare and contrast results of changes * 16 DIGIT PRECISION * Sine, Cosine and other trigonometric functions, Averaging, Exponents, Algebraic functions, and BASE 2, 8, 10 or 16 entry * Column and Row, Ascending and Descending SORTS for comparison of results * LOCATE FORMULAS OR TITLES IN CELLS * Easy entry, replication and block moving of frames * Global or Local column width control up to 78 characters width per cell * Create titles of up to 255 characters per cell * Limitless programmable functions * Typamatic Key Repeat * Key Beep * Typeahead * Print up to 255 column worksheet * Prints at any baud rate from 110 to 9600 * Print formats savable along with worksheet * Enter PRINTER CONTROL CODES for customized printing with letter quality or dot matrix printer * Combine spreadsheet tables with **VIP Writer™** documents to create ledgers, projections, statistical and financial reports and budgets.

Both versions feature Tape save and load, but the disk version also has the Mini Disk Operating System of the entire **Library**.

32K (Comes with tape & disk) \$59.95

32K does have hi-res displays, sort or edit.

Check These Library Prices:

- Fully CoCo 2 Compatible
- Nine Display Formats: 32 by 16
51, 64, 85 by 21 or 24
- True Lowercase & Descenders
- Four Different Display Colors
- 32 & 64K Compatible
- Memory Sense - Bank Switching
- Up to 51K Disk, 53K Tape
- Mini Disk Operating System
- Compatible With All Printers

VIP Terminal™

(Formerly Super "Color" Terminal)

RATED BEST IN JANUARY 1984 "RAINBOW"

By Dan Nelson

From your home or office you can join the communication revolution. The **VIP Terminal™** opens the world to you. You can monitor your investments with the Dow Jones Information Service, or broaden your horizons with The Source or Compuserve, bulletin boards, other computers, even the mainframe at work.

For your important communication needs you've got to go beyond software that only lets you chat. You need a smart terminal so that you can send and receive programs, messages, even other **VIP Library™** files. **VIP Terminal™** has "more features than communications software for CP/M, IBM and CP/M 86 computers." Herb Friedman, Radio Electronics, February 1984.

FEATURES: Choice of 8 hi-res lowercase displays * Memory-Sense with BANK SWITCHING for full use of workspace * Selectively print data at baud rates from 110 to 9600 * Full 128 character ASCII keyboard * Automatic graphic mode * Word mode (word wrap) for unbroken words * Send and receive **Library** files, Machine Language & BASIC programs * Set communications baud rate from 110 to 9600, Duplex: Half/Full/Echo, Word length: 7 or 8, Parity: Odd/Even or None, Stop Bits: 1-9 * Local linefeeds to screen * Save and load ASCII files, Machine Code & BASIC programs * Lowercase masking * 10 Keystroke Multiplier (MACRO) buffers to perform repetitive pre-entry log-on tasks and send short messages * Programmable prompt or delay for send next line * Selectable character trapping * Send up to ten short messages (KSMs), each up to 255 characters long, automatically, to save money when calling long distance.

All versions allow tape load and save of files and KSMs, but the disk version also has the Mini Disk Operating System common to the **Library**.

32K (Comes with tape & disk) \$49.95
(Tape comes in 16K but without hi-res displays)

Circle No. 57 on Reader Service Card



9072 Lyndale Avenue So. 812/881-2777
Minneapolis, Minnesota 55420 U. S. A.

TRS-80 is a trademark of Tandy Corp. VisiCalc is a trademark of VisiCorp.

**AUTHOR'S SUBMISSIONS
ARE ENCOURAGED.**

VIP Database™

(Formerly Super "Color" Database)

INCLUDES MAIL MERGE CAPABILITIES TOO!

By Tim Nelson

This high speed MACHINE LANGUAGE program fills all your information management needs, be they for your business or home. And it does so better than any other database program for the Color Computer, featuring machine code, lowercase screens and mailmerge capabilities. Inventory, accounts, mailing lists, family histories, you name it, the **VIP Database™** will keep track of all your data, and it will merge **VIP Writer™** files.

The **VIP Database™** features the **Library** Memory Sense with BANK SWITCHING and selectable lowercase displays for maximum utility. It will handle as many records as fit on your disk or disks. It is structured in a simple and easy to understand menu system with full prompting for easy operation. Your data is stored in records of your own design. All files are fully indexed for speed and efficiency. Full sort of records is provided for easy listing of names, figures, addresses, etc., in ascending or descending alphabetic or numeric order. Records can be searched for specific entries, using multiple search criteria. With database form merge you may also combine files, sort and print mailing lists, print "boiler plate" documents, address envelopes - the list is endless. The math package even performs arithmetic operations and updates other fields. Create files compatible with the **VIP Writer™** and **VIP Terminal™**. Unlimited print format and report generation with the ability to imbed control codes for use with all printers.

As with all other **Library** programs, the **Database** features the powerful Mini Disk Operating System.

32K DISK \$59.95

64K Required for math package & mail merge

VIP Disk-ZAP™

(Formerly Super "Color" Disk-ZAP)

RAVED ABOUT IN THE APRIL 1983 "RAINBOW!"

By Tim Nelson

Your database file disk, form letter disk, or BASIC program disk goes bad. An I/O error stops loading, or even backing up of the disk. Weeks, even months of work sit on the disk, irretrievable. Now catastrophic disk errors are repairable, quickly and with confidence, using the **VIP Disk-ZAP™**. It is the ultimate repair utility for simple and quick repair of all disk errors. Designed with the non-programmer in mind, the **VIP Disk-ZAP™** will let you retrieve all types of bashed files, BASIC and Machine Code programs.

This high-speed machine code disk utility has a special dual cursor screen display to look at the data on your disk. You are able to: Verify or modify disk sectors at will * Type right onto the disk to change unwanted program names or prompts * Send sector contents to the printer * Search the entire disk for any grouping of characters * Copy sectors * Backup tracks or entire disks * Repair directory tracks and smashed disks * Full prompting to help you every step of the way * 50-plus page Operators Manual which teaches disk structure and repair.

16K DISK \$49.95

Lowercase displays not available with this program.



For Orders ONLY
— Call Toll Free —



1-800-328-2737

Order Status and Software Support call (612) 881-2777

Available at Dealers everywhere.

If your Dealer is out of stock **ORDER DIRECT!**

In Canada distributed by Kelly Software Distributors, LTD.
P.O. Box 11932, Edmonton, Alberta T5J 3L1 (403) 421-8003

MAIL ORDERS: \$3.00 U.S. Shipping (\$5.00 CANADA; \$10.00 OVER-SEAS). Personal checks allow 3 weeks.

All Disk Programs are also available on 3" Diskettes for the Amdek Color AMDISK-III Micro-Floppy Disk System for an additional \$3.00 each.

©1983 by Softlaw Corporation

GOTO SCHOOL

by Dr. Paul Kimmelman

NESTLED AWAY IN CENTRAL Florida at one of the world's most popular tourist attractions is something very dear to each of us. Would it surprise you to know that our Color Computer is inside Walt Disney's EPCOT Communicore Teacher Center? I must admit I was pleasantly surprised to learn this. My curiosity compelled me to investigate further, and I ultimately discovered a teacher's technology paradise. If technology is what inspired you to become a computer fanatic — then have I got some stories for you!

At times I think we educators can't see the forest for the trees. We read article upon article, book upon book, all telling how to use computers or how easy it is to learn to program. Better yet, we need the sales pitch which scares half of us into fearing our children will fail the SAT exams if we don't rush out and buy them a computer. Threats aside, what *does* the computer mean to our future? What may happen to our society that is "good" because of computers? Future World provides an answer to these questions.

Future World is run by a Disney World computer that performs 72,000 functions per second. The imagination that went into its creation is outstanding. To quote David Brinkley, "It is the most imaginative and effective piece of urban planning in America, and this is totally aside from the Mickey Mouse park area itself." If this is where the computer age will lead us, get me a ticket. From making dinner reservations on a telephone that lets you see who you are talking to (yes, be careful of your facial expressions) to the solar powered toys in the gift shop, technology is everywhere. Observed from the context of Future World, computers could stimulate critical thinking skills: a task that should *never* leave our schools.

Walt Disney's original dream for EPCOT called for it to be a laboratory where creative experiments in applied technol-

ogy are encouraged. In a sense EPCOT is meant to become a "living blueprint" for the future. Before I discuss the Teacher Center, let's take a short trip through Future World. Caution! Words cannot adequately describe the sights. Future World is an indescribable educational fantasy trip. It can make learning fun, a Disney educational goal since it began marketing educational products.

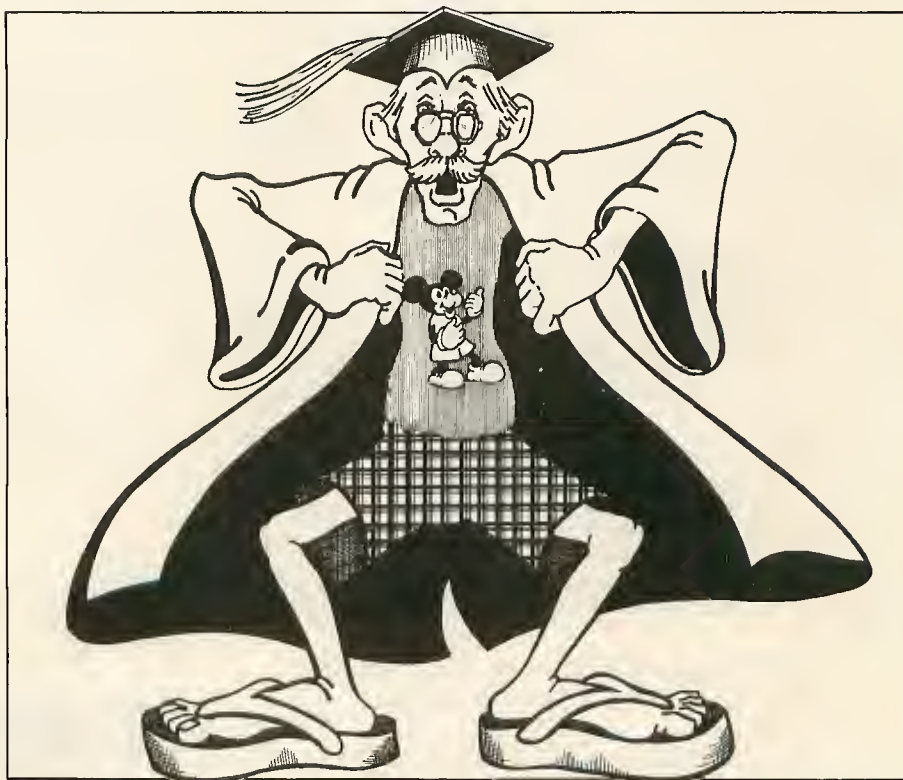
Future World

Future World is currently composed of seven major exhibits: Spaceship Earth, Communicore, Universe of Energy, Horizons, World of Motion, Journey Into Imagination, and The Land. A quick tip: if what I say interests you, and you tour the exhibits and want to use your newfound knowledge in your classroom, a

do it! We'll first enter *Spaceship Earth*, the gateway to Future World. If trivia facts impress you, be sure to remember that Spaceship Earth is a "geosphere," the symbol of EPCOT Center, and the largest structure of its kind in the world — 180 feet high.

Once inside Spaceship Earth you will take a ride that illustrates the dynamics and the importance of communications, from primitive cave sketches to futuristic technologies. The exhibit leaves little doubt that we have come a long way since hieroglyphics were used to communicate. As a matter of fact, when I looked at the future of communications it somehow outdated my Color Computer and modem!

Can you imagine going back to the days of dinosaurs and primeval forests? Consider the fact that your trip is power-



method exists. Classroom guide lesson plans for the exhibits have been written by the Disney staff (wait 'til we get to the Teacher Center).

It isn't important in what order you view the exhibits. If you can avoid a line,

ed with the aid of 80,000 solar cells on the roof. After avoiding fierce volcanic eruptions, you return to be entertained on a 210 foot screen depicting laser-like computer images demonstrating that people will build an energy bridge to the

future. All of this takes place in the Universe of Energy exhibit.

Next stop, World of Motion. This exhibit takes you a long way back in time to the cave days. I guess the wheel was to motion what the computer is to electronic technology. Here you can view transportation systems of the future by actually becoming a participant. What a fantastic opportunity for a student who is working on a project describing transportation from its beginning to where it may take us!

OK, enough for realism. Let's go to Journey Into Imagination and fantasize for awhile. Sounds like kid's play, doesn't it? Don't get too involved in the room where every step you take creates music, or where you create works of art with what I call a light pen — excuse me: "electronic palette."

The 3-D movie in Magic Journeys was frighteningly real. Wouldn't someone want to know that the movie was made with a 65 mm 3-D camera capable of shooting 75 frames per second? Never mind that most movies are shot at 24 frames per second, just get that butterfly off my nose. Journey Into Imagination was another of the educational-type exhibits that was just plain fun. Can learning really be this much fun?

Now let's go to The Land. If you expected your tour to be plots of land with little plants growing, you were wrong. The Land exhibit was designed with the assistance of the Environmental Research Lab at the University of Arizona. Your boat ride will present new food production techniques, for example: growing plants with only one-tenth of their normal water requirements, or even "stacking them up." Even more interesting was discovering that it may be possible to grow all food in greenhouses, a potential solution to food shortage problems.

What will really happen in the future? Where will we live? What would it be like to live in the ocean? Our next exhibit will provide some clues. Horizons features "future" ocean, urban, desert, and space habitats which illustrate the potential of the twenty-first century. Maybe it wouldn't be so bad living in space, but I'm not too keen on living under water. I had the choice at the end of the tour to see more about what it would be like in outer-space. Just push the button, and away I went.

Communicore

Finally, we're at Communicore, the home of the Teacher Center (parents can use it too!). The two buildings that com-

NEW! BT Companion

Expansion Interface Units

Basic Technology offers you the most features and best quality for the money!

Compare these features:

	BT COMPANION	TRS-80 Multi-Pak
• Power ON Indicator Light	YES	NO
• Cold Start Reset	YES	NO
• Gold Socket Connectors	YES	NO
• Gold Edge Connector	YES	NO
• Socketed Integrated Circuits	YES	NO
• Manual Cartridge Selector	Pushbutton	Slide Switch
• Keyboard/Program Selection	YES	YES
• Cartridge ON Indicator	YES	NO
• Extension Cable	YES	NO
• Number of Expansion Slots	5	4
• Warranty	180 days	90 days
• User's Manual w/schematics, parts layouts and parts lists	YES	NO

Also for the Color Computer:

BT-1010 Parallel Printer Interface	\$ 79.95
BT-1020 Real Time Clock/Calendar . . .	\$109.00
BT-1030 Versatile Interface Port	\$ 69.95

Add \$5 s & h. Check, money order, VISA, MC (Account # and exp. date). COD charge \$2 (req. certified check or M.O.). Mich. residents add 4% sales tax.

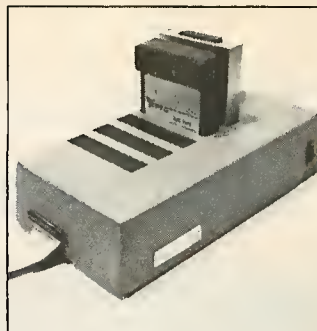
basic
TECHNOLOGY

Dept. C

P.O. Box 511

Ortonville, MI 48462

(313) 627-6146



BT Companion

New Price . . \$225.00

BT-1000 with

built-in power

supply \$250.00

With power supply

and 8k RAM \$275.00

CALL TODAY

or send for

FREE BROCHURE!

Circle No. 3 on Reader Service Card

cosmos
COMPUTER SERVICES, INC.

112 W. WISCONSIN AV.
KAUKAUNA, WI 54130
(414) 766-1851

THE COMPLETE TRS-80® LINE

STOCK ITEMS SHIPPED SAME DAY!

• ELITE CALC	\$54.95
• ELITE WORD	\$54.95
• ELITE FILE	\$67.00
• TOM MIX	CALL FOR PRICE
• SOFTWARE	

THE COSMOS CONNECTION IS A COMPLETE SERIAL TO PARALLEL INTERFACE FOR THE COLOR COMPUTER TO THE GEMINI — 10X and 15X PRINTERS.

- NO AC REQUIRED
- SWITCHABLE BAUD RATE
- AT: 600
- 1200
- 2400

\$60.00

- HIGH QUALITY CONSTRUCTION
- COMPACT
- 90 DAY WARRANTY

THE GEMINI-10X PACKAGE READY TO PLUG IN TO YOUR COLOR COMPUTER ONLY *

\$339.00

GEMINI-10X PACKAGE **

10X - \$289.00

15X - \$445.00

Delta 10 - \$484.00

Delta 15 - \$597.00



*Plus - U.S. ORDERS Add \$10.00 Shipping & Handling
*Plus - CANADIAN ORDERS Add \$25.00 for Shipping & Handling
**FREE - Shipping & Handling in U.S. with Package Orders
**Plus - CANADIAN ORDERS Add \$15.00 for Shipping & Handling with Package Orders

TRS-80 IS A TRADEMARK OF TANDY CORP. PRICES AND SPECIFICATIONS SUBJECT TO CHANGE.

stair
microelectronics inc.
THE POWER BEHIND THE PRINTED WORD.

Circle No. 155 on Reader Service Card

Publisher's Clearance!

Official Version

Frogger

Leapin Lizards.
Thousands sold
at 24.95

\$995

Avenger

Shoot'm up fun
Shoot sold
at 24.95

\$995

Scarfman

Eat em up
Pac Man
Reg sold at 24.95

\$995

Robot Attack

Robot, Robot,
everywhere
Reg sold at 19.95

\$995

Happy Hurdler

Run fast and
jump high. Reg.
sold at 24.95

\$995

Supplies Limited
603-924-9882

Carnival House

- 145 Grove Street
- Peterborough
- New Hampshire 03458
- 603-924-9882

prise Communicore will captivate any computer fanatic because of the countless hands-on opportunities. Ride a bike and find out just how much work you would need to do to power an electrical plant to run your home. You can talk to a robot, SMRT-1, play video games, even test your memory.

What does all this mean? To me, EPCOT represents what **The Color Computer Magazine** is all about. From a small computer in the Teacher Center to the world of the future lies a very important educational trail. The Color Computer may serve as the pioneering vehicle for our future engineers. How can we apply this knowledge to make it useful and practical? EPCOT's message should emphasize the importance that educators convey knowledge about not only how computers work and how they are programmed, but how they will change the way we live. It doesn't stop there. We should make these learning opportunities fun, not boring. We should make computer literacy classes an experience, not a lesson. Educators call it kinesthetic learning — when we become a part of the experience. I challenge anyone to leave Future World and not want to pursue our little electronic hobby. Certainly the Color Computer is only one small part of the computer world, but not an insignificant contribution.

Parents are welcome to the Teacher Center, but it is a "must" stop for teachers. Because Disney has always been involved with education, it seemed natural to Disney officials to provide educators with a place to translate the meaning of EPCOT for the nation's classrooms.

The Center was designed to provide an environment where educators can meet and discuss technology and education, screen new educational programs, (yes, Disney's Color Computer software is available) and bring the EPCOT experience back to their classrooms.

There is a private screening room to view filmstrips, movies, etc. Computers are available to preview software. An idea exchange board, which even opens up teacher pen pal opportunities, is a wall decoration.

Complimentary study guides are available upon request. The guides contain an instructional unit with lesson plans and worksheets. The guides are divided by color for recommended grade levels. Three levels are represented, Level A (Grades 3–6), Level B (Grades 7–9), and Level C (Grades 10–12). An important component of the lesson plan guide is the "Suggested Follow Up Activities" section. One of the suggested activities

for students in grades 10–12 on communications is to design, in small groups, a "History of Communications" board game. As a suggestion, it is noted that the game could be an episodic maze in which a figure overcomes obstacles on the way to exchange a secret message.

The Land lesson plan guide suggests that students in grades 3–6 be shown pictures of different types of farms, invite guest speakers to their classroom, or even asks them to draw pictures of a farm they would like to own.

The Teacher Center is one part of the Disney educational program. A whole host of educational media is available. Fortunately for Color Computer owners, Disney has produced software for us. The Disney commitment to Radio Shack equipment cannot be treated lightly by educators because of the future educational implications of school lessons being offered directly from EPCOT to the

*"The commitment...
cannot be treated
lightly by educators..."*

classroom. As I was leaving EPCOT Center, I was intrigued by the large satellite dish behind the ominous fence with a sign stating, "Employees Only." With its own cable television channel, the future for Disney holds some impressive educational potential.

I feel that EPCOT represents what education should be all about: fun, motivating, practical, and exciting. I am dismayed by teachers who write me because their administrators don't see any value in computers and simply won't buy them. Dennis Kitz said it best in his November, 1983 "End of File," when he complained of how computers were being used in schools — or did he mean, "abused"? All the doubters should take a ride through Future World and then tell me that computers won't affect our lives every day. Don't tell me computers have no place in our schools. Use them properly. Let students be creative. Show young students how to use the computer.

My tour of EPCOT demonstrated to me what is happening in our world. There is an abundance of knowledge housed in those seven exhibits. EPCOT is a fine example of the excellence that can happen when educators look to a dedicated private sector for help. ■ ■ ■

PROGRAMMER'S SKETCH PAD[®]

 *Saves Time & is Easy to Use*

 *Durable & Attractive*

 *Have Fun & Learn*

 *Would You Like To Design:*

- a) BUDGETS
- b) INVENTORY LISTS
- c) GAMES, GRAPHICS

The Kit includes: Two thick mylar coated **graphs** of the color computer's screen; step by step **instructions** for the beginner; two **demo programs**, and easy to follow "how to personalize" **budgets** that *you* write.

Each Sketch Pad has print locations on one side and set screen locations on the other, along with their corresponding commands and color codes.

Now you can take the screen with you wherever you go; school, work, or play. If you get a good idea, simply pull it out and draw or write down what you thought directly on the screen. When you're done with it, just wipe it off!

Don't delay, order yours today. . .

ONLY \$
CANADA—\$13.50
EUROPE—\$14.50

12

Calif. residents
add 6% sales tax.
(Postage paid.)

TO ORDER:

CALL (707) 722-4280

or WRITE TO: P.O. BOX 257

SYNPACTICS[®]

REDCREST, CALIFORNIA 95569

ORDER FORM SP1

Quantity

Name

Address

City State

Country Zip

Charge:  ☐  ☐

Acct. No.

Expiration Date

Signature



I would like to interface the Brother Executron Model 65 electronic typewriter with my Color Computer. I know the typewriter is compatible with a TRS-80 Model III.

The problem, as I understand it, is that the Color Computer has a parallel port and the Model III has a serial port. Can you offer any suggestions?

— H.M., Greensboro, NC

That's not quite right. You have the ports reversed: the Color Computer's is serial and the Model III's is parallel.

To use the Brother typewriter, you need a serial-to-parallel converter box. I know of two currently on the market: Botek Instruments (4949 Hampshire, Utica, MI 48087, (313)739-2910) sells one for \$69, and The MicroWorks (P.O. Box 1110, Del Mar, CA 92014, (619) 942-2400) sells the other, the PI80C, for \$59.95. They both plug into your serial output port, leaving the ROMpak port free. Keep an eye on ads for other converters.

Perhaps Brother makes a serial-to-parallel converter box — check with them. Several typewriter companies are producing the boxes in an attempt to tap into the micro market.

I have a 64K Extended Basic Color Computer and a Gemini-10X printer, connected by an 8010-X serial interface.

I bought a ROMpak program and made copies of ColorFile and Spectaculator on tape, believing I could POKE 150,7 before typing EXEC, to change the printer baud to 4800 from the default rate of 600. But it doesn't work. Can you help?

— T.S., Lutz, FL

Both Spectaculator and ColorFile use their own routines to drive the RS-232

printer port. You must find the baud locations for each of these two programs, POKE in the 4800 baud, then execute the programs.

Unfortunately, I don't know the baud location in either program. Can someone else help us here?

I have a 32K Extended Basic Color Computer, and I want to learn the basics of game programming. That means I should learn to program in assembly language.

I have searched and searched, but can't find a book on assembly language programming. Can you make any suggestions?

— J.B., Tampa, FL

Here are four books that'll get you going in 6809 assembly language programming:

6809 Assembly Language Programming, Lance Leventhal, Osborne/McGraw-Hill, 2600 Tenth St., Berkeley, CA 94710, \$16.99.

6809 Microcomputer Programming and Interfacing, Andrew Staugard Jr., Howard W. Sams & Co., 4300 W. 62nd St., Indianapolis, IN 46268, \$13.95.

The MC6809 Cookbook, Carl Warren, TAB Books, Blue Ridge Summit, PA 17214, \$6.95.

Color Computer Programming, William Barden Jr., Radio Shack, #62-2077, \$6.95.

Is there a POKE to disable the Break key on the Color Computer 2 (16, 32, or 64K)? And is there one to restore it to normal operation afterward?

— S.B., Fallon, NV

All the experts I've talked to say that isn't possible. The keyboard scan for the

Color Computer resides entirely in ROM. Your only choice is to intercept the entire routine and write your own keyboard routine that excludes use of the Break key.

If you want to tackle that programming project, get yourself the July 1983 issue of **The Color Computer Magazine**. The ROM keyboard scan routine is disassembled on page 57.

Has anybody tried to use the Brother EP-22 as a printer with the Color Computer? I can't seem to get it to work with my computer (ROM version 1.1).

I've connected these pins from the RS-232 to the printer: 1 – 20 (data terminal ready), 3 – 7 (signal ground), and 4 – 3 (data line out from computer).

Whenever I try to send anything, only the first character is printed. The computer then freezes up and must be reset.

I tried changing the baud, and connecting pin 5 of the joystick port to pin 1 in the RS-232, but neither helped. What's wrong?

— F.M., Elmhurst, NY

You managed to get the first character correctly printed by the EP-22 — that's a good sign. It means that the software is working (baud, word length, stop bits, and parity are all correct).

Since printing immediately halts after this first character, the Color Computer doesn't know that the EP-22 has successfully printed it. The computer is waiting for the EP-22 to signal that it's ready.

You have the wrong Color Computer pin connected to pin 20 of the EP-22: hook up pin 2 to pin 20, pin 3 to pin 7, and pin 4 to pin 3.

I read that if you type EXEC 41175 the screen shows the ROM version number of your computer.

I got to fooling around and tried typing EXEC, followed by different numbers. EXEC 1 froze the keyboard, and another number cleared the screen.

What do these codes mean?

— J.L., Mustang, OK

The Exec (execute) command tells the Basic ROM to transfer control of the computer to the address specified. EXEC 41175 transfers control to a simple print routine that puts the current ROM version number on the screen.

Your College Future Starts Today



TYPE Node = RECORD
Next := Node;
NodeName := String(15);

TYPE Month = (Jan, Feb...

MthDys := ARRAY [Month] OF 28..31;

WITH ThisNode DO
Next := Next.Next;

READ (A,B);
WRITELN ('RESULT', 3.2E5*SIN(A));

CASE ThisMonth OF ...

The *Education Testing Service (ETS)*, famous for managing the SATs) have based the college computer science advanced placement (AP) test on **Pascal**.

DEFT Pascal \$79.95

DEFT Pascal Compiler

complete Pascal language
generates machine language object

DEFT Linker

combines multiple program objects
into one binary program

DEFT Pascal Workbench \$119.95

(DEFT Pascal And DEFT Bench Together)

DEFT Bench \$49.95

DEFT Debugger

debug Pascal machine programs
symbolically

DEFT Macro/6809

supports entire 6809 instruction set
lets you define your own instructions

DEFT Edit

Full screen editor

DEFT Linker

(see DEFT Pascal)

DEFT Lib

create and maintain program object
libraries

Here's what Frank Esser of The RAINBOW Magazine says of **DEFT** Version 2 Software:

"I am totally impressed with the professional quality of both the programs and the documentation."

"... includes all the necessary tools for the serious programmer to produce good programs with a minimum of effort. For those who are not familiar with Pascal, I think it provides an excellent environment to learn in."

All **DEFT** software and programs developed with **DEFT** software are BASIC ROM independent and use all of the memory in your Color Computer without OS-9. All you need is **DEFT** software and a TRS-80 Color Computer with Extended Disk BASIC, at least 32K of RAM and One Disk Drive. All orders are shipped UPS within 24 hours of receipt. Add 3% for shipping and handling; Maryland residents add 5% for State Sales Tax; add \$2.00 for COD.

For Product Questions Call
1-301-253-1300

For Credit Card Orders Call Toll Free 24Hrs
1-800-368-3238 Operator 8
In Virginia

1-800-542-2224 Operator 8

Or Fill Out Our Order Coupon And Mail To:

DEFT Systems, Inc.
Suite 4, Damascus Centre
Damascus, MD 20872

DEFT is a Trademark of DEFT Systems, Inc.
TRS-80 is a Trademark of TANDY Corporation

Quantity of Each: ☐ DEFT Pascal ☐ DEFT Bench
☐ DEFT Pascal Workbench

Method of Payment (check one) ☐ Check Enclosed ☐ VISA
☐ Master Card ☐ COD

Account Number

Card Expiration Date /

Signature

Name

Street

City State Zip

HI-RESOLUTION SCREEN UTILITY

HI-RES SCREEN UTILITY
Featuring:
• Double Height Characters
• On Screen UNDERLINE
• Bell Character Tone Generator
• Switchable Full Screen Reverse Video
• True Upper & Lower Case Character Set
• **28 Characters per line**
• **36 Characters per line**
• **42 Characters per line**
• **51 Characters per line**
• **64 Characters per line**
Line lengths of 85, 128 & 255 are unreadable but can be very useful for screen display layouts.
All functions are easily programmable thru BASIC. Fully BASIC COMPATIBLE including ELS & PRINT.

- FULLY BASIC COMPATIBLE
- DISPLAY FORMATS OF 28 TO 255 CHARACTERS PER LINE
- FULL 96 UPPER LOWER CASE CHARACTERS
- MIXED GRAPHICS & TEXT OR SEPARATE GRAPHIC & TEXT SCREENS
- INDIVIDUAL CHARACTER HIGHLIGHTING
- REVERSE CHARACTER HIGHLIGHT MODE
- WRITTEN IN FAST MACHINE LANGUAGE
- AUTOMATIC RELOCATES TO TOP OF 16 32K
- AUTOMATICALLY SUPPORTS 64K OF RAM WITH RESET CONTROL
- REVERSE SCREEN
- ON SCREEN UNDERLINE
- DOUBLE SIZE CHARACTERS
- ERASE TO END OF LINE
- ERASE TO END OF SCREEN
- HOME CURSOR
- BELL TONE CHARACTER
- HOME CURSOR & CLEAR SCREEN
- REQUIRES ONLY 2K OF RAM
- COMPATIBLE WITH ALL TAPE & DISK SYSTEMS

\$19.95

NEW

Introducing The "Super Smart"
DATA PACK II
Terminal Communications Software

NEW

"FEATURES"

- No Lost Information When Using Hi-Resolution Display On Line
- ASCII Compatible File Format
- Full Text Buffering
- Terminal Baud Rates 300 to 9600
- Automatic Word Wrap Eliminates Split Words
- Full/Half Duplex
- Automatic File Capture
- Programmable Word Length, Parity and Stop Bits
- Save and Load Text Buffer and Program Key Buffers to Tape or Disk
- 9 Hi-Resolution Display Formats, 28 to 255 x 24
- True Upper/Lower Case Display
- Kill Graphics Option for An Extra 6K
- Supports Line Break
- Freeze Display and Review Information On Line
- Send Files Directory from Buffer or Disk
- Full Disk Support for Disk Version
- Send Control Codes from Keyboard
- Separate Printer Baud Rates 110-9600
- Display On Screen or Output Contents of Buffer to Printer
- Automatic Memory Sense 16-64K
- 9 Programmable Function Key Variable Length Macro Buffer
- Programmable Prompt Character or Delay to Send Next Line
- Programmable Control Character Trapping
- Programmable Open/Close Buffer Characters
- Automatic Key Repeat for Editing
- Program and Memory Status Displays

DISK \$44.95

TAPE \$34.95



5566 Ricochet Avenue
Las Vegas, Nevada 89110

(702) 452-0632

All Orders Shipped From Stock
Add \$2.50 Postage

Circle No. 5 on Reader Service Card



TEACHERS USING COLOR COMPUTERS, A GENTLE THREE STEP PATH TO EASY CLASSROOM MANAGEMENT

1. Send a \$10 check for the demonstration cassette with programs for grading and student information. This may be all you need.
2. After working with the programs and deciding that they are, or could be useful, send a \$40 check for the manual and subscription to the programming service. You are then welcome to call or write for information, assistance, and discussion of your unique requirements.
3. You may need a customized version. After we have agreed on the revision and its cost I will send the changes to you.

Richard Sailors,
user friendly programmer
Sailors System Software
1943 North Garfield Avenue
Pasadena, California 91104
818-798-8273

Will work on any
16K, but has been
designed for 32/64K
and a printer. A
disk drive may
become handy.

Circle No. 80 on Reader Service Card

Just plugging numbers into the Exec command to see what'll happen is something like shooting a bullet into a gasoline storage depot: unless you're very lucky (or unlucky, depending on your outlook, everything is going to blow up.

The first 1023 bytes of RAM are reserved by Basic for pointers and control bytes. Bytes 1024 to 1535 are used for text video display, and from 1536 on up are the graphics pages and any Basic programs. ROM starts at address A000H and runs to DFFFH. The area from E000H on up is reserved for ROMpak cartridges and SAM control addresses.

Unless you know the exact addresses for what you want, most of your POKE-ing will be useless.

I have a 32K Color Computer. I want to buy an Epson RX-80 printer. Can my computer work with this printer? And will Telewriter 64 work with it?

— R.L., San Antonio, TX

The Epson RX-80 is a stripped-down MX-80. It comes with a parallel port. To make it work with the Color Computer you must have a Golden Eagle Serial Interface installed (Epson part #8155, \$95) in the RX-80. Connect pin 20 of the Epson to pin 2 of the R/S, pin 7 to pin 3, and pin 3 to pin 4 (RTS protocol).

The RX-80 should work just fine with Telewriter 64. Other sources of interfaces are Botek Instruments, The Micro-Works, and PBH Computer Products — check ad pages for addresses and other options.

I recently purchased a disk drive for my computer. I own a grey 64K Extended Basic Color Computer with an F board, and the disk drive is white.

I used the drive for a short time, then my computer stopped working. My Radio Shack dealer said the drive goofed up my computer. The company where I got my drive said it should work fine with the grey computer. My dealer said that only a grey drive should be used on a grey computer.

Now I don't know what to do. Can you help?

— S.B., Jetmore, KS

My answer depends on exactly what you bought. If you bought a white-case drive-zero disk drive with a ROMpak disk drive controller, then your computer won't work with the disk drive. The white-case drive-zero disk drive and its controller ROMpak will only work with

the Color Computer 2. The grey-case drive-zero disk drive and its controller ROMpak will only work with the original (grey) Color Computer.

If you already have a grey-case drive-zero disk drive with its controller, and the white-case disk drive is running as drive 1, then the drive shouldn't adversely affect your computer's operation. The only problem is if the white-case disk drive is configured as a drive-zero and has the terminator resistor-pak in place. Only one of the drives connected to your computer is supposed to have the terminator-pak. Having two drives with the paks will cause electronic problems in your computer.

Would you please tell me how to reset data pointers so I can begin a Read statement in the middle or towards the end of my data listings? The loop I presently use is much too slow.

—J.E., North Canton, CT

When you type RESTORE, the ROM simply moves the data pointer from its current position to the beginning of your program. To position the pointer to a specific piece of data, you must place the address of that piece of data in the data pointer address.

To execute a partial restore, you have to know the address in RAM of the piece of data you want to be first.

One possible method of accomplishing this is to place a dummy string variable in front of each position in your data list where you want these partial restores to occur. Then use the VARPTR command to get the variable's address. POKE that address into memory locations 33H and 34H. You'll also have to POKE the line number of that piece of data in locations 31H and 32H. Put the MSB (Most Significant Byte) of the two-byte hexadecimal address in the first location of each pair, and the LSB (Least Significant Byte) in the second address. The memory map showing these locations is on page 46 of **The Color Computer Magazine**, April 1983.

Please explain why the logical operators AND, OR, and NOT are used in expressions such as (8 AND 5)?

—E.A., Mt. Carmel, IL

These commands are known as Boolean operators. They force the computer to compare two variables on a bit-by-bit basis. The variables used with Boolean operators are called the *arguments* of the comparison.

Using constant numbers for the arguments, as in your examples, wastes RAM and CPU time since the result of these operations will always be the same. The result of 10 and 13 will always be 8, so why not just test for 8?

These operators are restricted to integer numbers between -32768 and +32767.

The AND operator compares 16 bits of the first argument with 16 bits of the second argument. A *true* response results when any bits in the two arguments are the same. A *false* response is given if none of the bits are in common. Only those bits that are 1's in both arguments are reported in the answer. That is:

```
10  = 00001010
13  = 00001100
ANDed = 00001000 = 8
```

To illustrate the different Boolean arguments and their various responses, mathematicians use a truth table:

A AND B		
A	B	Response
0	0	0
0	1	0
1	0	0
1	1	1

When used in an If...Then statement, the Boolean true response will execute any code that follows the Then. Otherwise the logic falls through to the next statement below the If...Then. If you're using If...Then...Else, a false response will execute the code following the Else.

The AND operator is usually used to test for specific numbers by comparing one variable argument with a fixed argument. For example:

```
IF 128 AND A THEN 100 ELSE 200
```

This statement will execute Line 100 only when A is 128 or more (bit seven of values from 128 to 255 is always a 1).

The OR operator returns a true response when either of the two arguments has a 1 in its bits. A false response is given only if both arguments are 0.

A OR B		
A	B	Response
0	0	0
0	1	1
1	0	1
1	1	1

The NOT operator is used with a single argument to invert (or negate) the Boolean value of that argument; that is, it's true only when the argument is zero.

NOT A	
A	Response
0	1
1	0

SUPER BACK-UP UTILITY[®]

1. TAPE TO TAPE
2. TAPE TO DISK
3. AUTO RELOCATE
4. DISK TO TAPE
5. DISK TO DISK

(Regardless of most protection schemes!)

- * MENU DRIVEN!
- * REQUIRES 32K EXTENDED COCO
- * REQUIRES 1 OR 2 DRIVES
- * ALL MACHINE LANGUAGE!!!

★★★ ONLY \$49.95! ★★★
(SUPPLIED ON DISK)

GRAPHICOM

Simply stated - the finest graphics program written for the COCO (or any other computer)!

FEATURES

- * USER FRIENDLY!
- * 4 Mode (Including Hi-Res Artifact)
- * Animate Mode
- * Color Palette with over 15 color patterns for use with Hi-Res Artifact
- * Send/Receive pictures over standard modem at 300, 600 or 1200 baud
- * Supplied utility allows capturing Hi-Res Screens from most COCO arcade type games (Even protected ones)
- * Multiple Hi-Res character fonts user changeable & definable
- * Supplied utility for transferring graphicscom screens to basic or other M/L Programs
- * Supplied utility for loading screens from basic or other sources
- * Built in Screen print (Pre-defined for Epson C 100k RSL P VII LP VII) DMP 100 DMP 200 DMP 120 GGP 115 GEMINI 10 and GEM 110 to 9600 baud
- * Slow scan television send/receive options
- * Many additional features, operating hints, hardware mods and suggestions etc etc!

★ EASY TO LEARN GRAPHIC MENU ★
REQUIRES 64K COCO - 1 DRIVE - JOYSTICKS
INTRODUCTORY PRICE FROM COMPUTIZE
\$21.95

SPIT-N-IMAGE (C)

M/L Disk Back-Up Utility

G-U-A-R-A-N-T-E-E-D to back-up any diskette advertised in this issue! There is no need to suffer the heartbreak of crashed disks any longer! Spit-N-Image will create a mirror image of your valuable disk programs which do not respond to normal back-up functions. Will also initialize and back-up in one pass. Data processing experts always insist on having a back-up - it's good practice - Don't wait!

REQUIRES 32K CC AND 1 OR MORE DRIVES
CASSETTE \$29.95 DISKETTE \$34.95

T.T.U. - TRIPLE TRANSFER UTILITY (C)

M/L For Cassette & Disk Program Transfer

Transfer contents of disk to tape - Transfer contents of tape to disk - "Select" or "All" Option - Will automatically relocate those cassette programs that conflict with the disk operating system - Will display machine language program address - Copies ASCII, Basic, & Machine Language Programs - All contained in 1 menu driven program!!

REQUIRES 32K CC EXT.
Cassette \$19.95 Disk \$24.95

TREK-TRIV

The Star Trek Almost Impossible Super Trivia Quiz

For serious "Treks" only! All others need not apply!

- * Four programs on one cassette
- * Trek, Trek II, Quiz and Quiz II
- * Sound Effects
- * Advance through various sections and receive promotions up to fleet admiral! But if you mess well, you'll find out!
- * Receive a print-out of your rating, rank, and intelligence description (sometimes a bit harsh - but only if you deserve it!)
- * Fun - but V-E-R-Y Challenging

REQUIRES 32K COCO, CASSETTE RECORDER
(PRINTER OPTIONAL)

SUPPLIED ON CASSETTE - ALL FOR \$19.95

*** MORE SUPER TRIVIA GAMES COMING - STAY TUNED ***

COMPUTIZE INC.
P.O. BOX 207
LANGHORNE, PA 19047

Check or M.O.

VISA MasterCard

Add \$2.00 Shipping
PA Res add 6% sales tax

215-946-7260

Circle No. 90 on Reader Service Card



On the Road

*Building bridges, making in-roads:
the development of operating systems.
Part I.*

by E.M. Pass, Ph.D.

OPERATING SYSTEMS are used on mainframe computers, mini-computers, and microcomputers. They form the vital link between people and computer circuits, regardless of the computer's size.

Operating systems that run on the Color Computer include Radio Shack's DOS, TSC's Flex, and Microware's OS/9.

Operating system functions fall into several categories: job management; task management; input-output management; main memory management; and secondary storage management. Not all operating systems provide all these functions, and some provide functions which others perform externally or do not support at all.

One manufacturer has come up with a technique for running CP/M on the Color Computer. You simply install a plug-in board containing a CPU capable of run-

ning CP/M, a PROM or ROM, and other circuitry which disables the 6809 in favor of the CPU on the board. (Ed's Note — a second CP/M system should also be available by the time this article is in print.)

Originally operating systems' functions were meant to make it easier to write, debug, and run programs. As mainframe computers became more complex, and especially as the demand for computer time and resources grew, operating systems became more complex and offered many more facilities. Computer hardware then became more sophisticated.

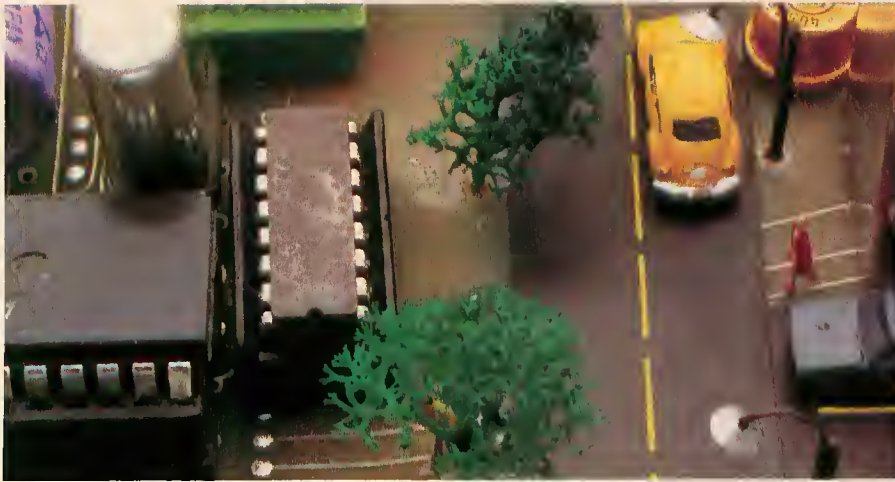
The development of increasingly-complex software and operating systems on increasingly-complex mainframe hardware was repeated over a much shorter time on micros and minis. At one time micros had 8-bit data paths, minis had

12-bit to 24-bit data paths, and mainframes had at least 32-bit data paths. The definitions of mainframes, micros, and minis have become more variable, though. Now there are micros with 8-bit, 16-bit, and 32-bit data paths, and the trend towards more powerful and faster micros continues. Manufacturers may, in fact, decide what to call their machines based on the markets they hope to reach.

Now let's look at major operating system functions.

Job Management — every operating system provides some kind of job management. It may take the simple form of letting a single user load and start programs (as on first-generation mainframes, and simple operating systems such as Radio Shack's DOS for the Color Computer). It may take the much more complex form of controlling all the resources of a computer system in a multi-

to OS



programmed or multiprocessor environment.

Job management allows some system-access security and accounting. A potential user must log into the system before being allowed to use its resources.

Every operating system provides some form of task management, as well as some form of job management. In simple operating systems such as Radio Shack's Color Computer DOS, they are the same. However, many operating systems provide separate task-management facilities. (I use the term *task management* rather than *program management*, since a program is composed of one or more tasks.)

The tasks associated with running programs usually concern resource allocation. Main memory space is always required to load the program and data areas before the program can begin execution. Time is required on data channels or hardware device drivers to transmit information to and from main memory. CPU time is required to execute the instructions in the program and in the operating system.

In monoprogrammed systems (systems that have only one task), resource allocation is much simpler than in multiprogrammed systems. Much of a monoprogrammed system will be idle at any given time, since very few programs can occupy more than one part of a system for more than a short time. On microcomputers, "wasted" computer power is not a great issue. The value of "recovered" computer power must be weighed against the increased complexity of the hardware and software required to support multitasking, especially for non-business users.

The earliest serious attempts at multitasking were of two main types. One was the development of programs, such as the time-sharing interpreter, which performed only a tiny bit of work for each user before going to the next, giving

each user reasonably good service unless several requested heavy computations at the same time. Several Basic interpreters for 6800 and 6809 microcomputers were made multi-user by adding interval timers and by bank-selecting 16K- or 32K-byte memory boards for switching among users.

The other method was the development of background interrupt-driven spoolers (Simultaneous Peripheral Operation On-Line). The Flex operating system supports spooling from disk to a printer, although not on the Color Computer.

*"On microcomputers,
"wasted" computer
power is not a
great issue."*

Neither approach requires a sophisticated task-management system, but neither provides really good use of all parts of the computer system. Early attempts at task-management software and hardware often wasted more resources than they saved; this trade-off is still a major concern. Programs used on a multitasking system must be *re-entrant*; that is, they must be designed to execute the same way no matter how many times they have been partially executed. The programs cannot be self-modifying, and data pointers must separate instructions used consistently to reference variable data from the program. Also, data files should be available to all users whether they be on direct-access storage or in memory.

The dynamic-allocation form of task management is used in Unix, CP/M, Flex, Uniflex, and OS/9. A command line interpreter elicits the name of the program and then runs it if sufficient main memory is available.

The program is responsible for requesting that the operating system open and close files, provide memory space, and allocate resources. This approach simplifies or eliminates complex job or program schedulers in favor of simpler command line interpreters.

The more sophisticated operating systems (including MVS, Unix, Uniflex, and OS/9) let programs generate new tasks for the operating system to process asynchronously or synchronously with the original task. As a result, the terms *multi-programming* and *multitasking* are almost interchangeable.

This greatly simplifies some applications: One program can spawn and monitor the progress of a number of special-purpose tasks. It even simplifies parts of the operating system itself: The command line interpreter can generate and wait for the completion of programs requested directly by the user or indirectly from a command script.

An important aspect of task management is the ability of tasks to request actions of the operating system. Under some systems, the supervisor handles the program requests, in addition to its other duties. Under other systems, the operating system provides a separate facility for handling direct requests.

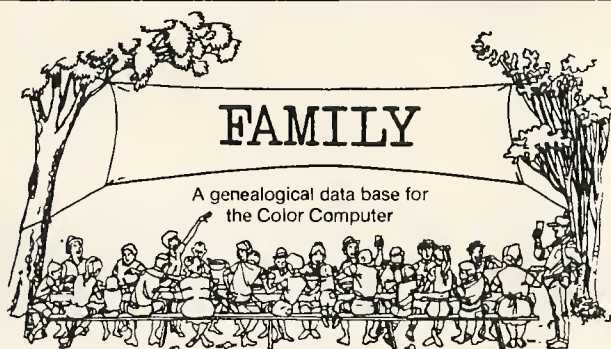
Requests to open files, provide additional main memory and spawn a task are all examples of operating system calls. On many hardware systems, access to peripheral devices is possible only by requesting operating system services through calls.

Almost all supervisor activity begins with an interrupt or with a system call, which is usually also an interrupt. Familiar exceptions are Flex, in which system calls are direct-vectored subroutine calls, and CP/M, in which system calls use the RST instruction (effectively a short subroutine call to a fixed low address). OS/9 uses the SWI2 instruction for system calls, Uniflex uses the SWI3 instruction, and MVS uses the SVC instruction, all of which are interrupts.

On systems with protected-instruction modes, an interrupt is a means by which the operating system regains control in the protected mode. The exact nature of interrupt systems and of processing depends on the hardware.

A very powerful and useful facility provided by the supervisors of certain operating systems is *extended instruction emulation*. Instructions invalid on the

PETROCCI FREELANCE ASSOCIATES



Maintains data on 255 people in first eight generations of your family tree. Prints 3 charts; 5 generation pedigree - graphic display of lineage; Family group charts; ancestors by reference number. Easy to use.
32K EXT 14.95

Inspector Clueseau



• INSPECTOR CLUESEAU

The No. 1 Murder Mystery for the CoCo!
(Every game is different.) 32K EXT 19.95

See Special
Prices Below

INVESTMENT SPECIALS SAVE 30%

Good Through
July 31, 1984

• REAL ESTATE INVESTMENT

Provides "What If" analysis
of rental investments
16K EXT 17.45

• OWNER FINANCED REAL ESTATE

Evaluate offers, prepare counter
offers with this handy program
16K EXT 17.45

• HOMEOWNER SELLING ANALYSIS

Select best price/best time to sell
16K EXT 17.45

• STOCK MANAGER

Disk based - graphically plots data
Portfolio value update, Printer output
32K EXT DISK 27.95

• BOND ANALYSIS

Helps you select the best buy
16K EXT 13.95

BOWLING SECRETARY

(New Super Second Edition)

Now includes handicap routines for both men and women, pin spotting, selection of up to 15 players per team, plus the standard team standings, individual average, high and total pins, team won/lost, high series, cumulative total team points.

Printer Output & Screen Display

32K EXT - 24.95 Std. 16K Version Still Available

LITTLE LEAGUER



Does all the record keeping for you. Excellent printout. Allows mid season entry
Keeps 19 different statistics and individual as well as team statistics.

Easy screen editing features - allows editing of single player data. Saves to tape or disk.

32K EXT 24.95

Statistical Analysis

32K EXT 2 Programs for 34.95
Stress Evaluator

16K EXT 24.95

Medical Terminology

32K EXT 19.95

Heart Lung Circulatory

32K EXT 34.95

Weather Forecaster

32K EXT DISK 19.95

Weather Watch

16K EXT 24.95

Hurricane Tracker

16K EXT 15.95

Print Spooler

64K 11.95

Master Graphics Tool Kit

32K EXT 39.95

Text Master Graphics

32K EXT 19.95

All Programs 16K Tape
Unless Otherwise Specified
All Programs Available on Disk - Add \$5.00
Special Sale Prices - Retail Only

Include \$1.50 for handling for each program
Arizona residents add 7% sales tax
Quantity Discounts to Dealers



PETROCCI FREELANCE ASSOCIATES

651 N Houghton Rd
Tucson, AZ 85748
602-296-1041



Super Disk Utility

32K EXT DISK 44.95

Real Estate Investment

16K EXT 24.95

Homeowner Selling Analysis

16K EXT 24.95

Owner Financed Real Estate

16K EXT 24.95

KIDS KORNER

Preschool Package, ABCs,

123s, Shapes, Big-Bigger

All Four 24.95

Guillotine Spelling

Game 16K EXT 9.95

Alphabet Song

16K EXT 11.95

hardware are used in application programs. When they are encountered, an invalid-instruction interrupt passes control to the operating system, which has routines that emulate the extended instructions. Control then passes back to the program. If the same program is run on hardware that recognizes the instructions, it will run much faster.

This method is often used to emulate floating-point or decimal-arithmetic hardware on smaller or cheaper CPUs without requiring different compilers or libraries.

Trace facilities are similar to emulators. The hardware interrupts the program execution after every instruction, letting the user trace the execution. Motorola 68000 hardware supports extended instruction emulation and instruction trace.

Input-Output Management

A major component of any operating system is the input-output control system (IOCS). The IOCS simplifies memory input and output in single-user systems. The degree of control over the hardware and software varies from system to system.

Each class of input-output devices has some basic unit of information, the

smallest amount of data that can be transferred in one operation. This unit is usually called a *physical record*. For some devices, such as disk drives, a physical record has a fixed length. For other devices, such as magnetic tape and telecommunications lines, a physical record may vary in length.

Each class of input-output devices has

"For some devices, such as disk drives, a physical record has a fixed length."

its own means of using or generating records. The latency time, or the time between a request and a response, also varies significantly among devices. Access to a device can be either sequential or random.

The IOCS performs the following tasks in most operating systems: translating; scheduling; interrupt-handling; and buffering.

Translating input-output requests is an important function of most IOCSs. Since

control of input and output is centralized in the IOCS, the definition of symbolic or generic device names is made much simpler, and, in multiprogrammed systems, is almost essential.

In some operating systems, rather than specifying an absolute port, absolute address, or specific symbolic device name, application tasks may refer to devices by symbolic class names.

OS/9 and CP/M support symbolic device names, but not symbolic class names (although OS/9 device drivers could use them for devices under their control). Flex does not support symbolic device names or symbolic class names. Uniflex and Unix support symbolic device names (for disk devices) but not symbolic class names. OS, VS, and MVS support absolute port numbers, symbolic device names, and symbolic class names.

The symbolic class names are used by most OS, VS, and MVS application programs for most allocations. Symbolic device names are used for devices with unique characteristics. Absolute port numbers are usually used only in very special cases, such as in a telecommunications monitor.

Interrupt handling is another important low-level function. Interrupts that are caused by data channels completing their assigned operations are eventually



MIM

THE MAGIC IMAGINATION MACHINE

GROTO
P.O. Box 9002
Orcutt, Texas 75767
97.00 P & H. Texas H. 6.3. Int'l. Incl. 5% S. Tax

CALL JR. SYSTEMS/GROTO
(915) 333-1127 (4-11 WKS.)
C. sh. Check, M.S. Visa/Mastercard

FEATURES:

- 7168 BYTES OF RAM
- 8 INPUT A/D CONVERTER
- 2 D/A CONVERTERS
- SOUND MIXERS
- EPROM PROGRAMMER
- FUNCTION GENERATOR
- 4 PARALLEL AND 1 SERIAL I/O
- DISK COMPATIBLE
- FULLY BUFFERED
- POWER SUPPLY

DOCUMENTATION:
SCHEMATIC; FUNDAMENTALS TO:

- STORE DATA AND CHANGE BANKS.
- CONVERT VOLTAGES TO NUMBER
- STORE AND PLAY BACK VOICE OR USE COMPUTER AS X/Y PLOTTER OR MAKE VOICE PRINTS.
- USE D/A CONVERTERS TO PRODUCE VOLTAGE PATTERNS AND SOUND OR MODULATE FUNCTION GENERATOR.
- DRIVE PARALLEL AND SERIAL PRINTERS.
- CONTROL FUNCTION GENERATOR.
- USE EPROM PROGRAMMER MCM68766 MCM68764 MCM68732 MCM2532 2764 2732 2716 2718'S FIT MIM'S 2K SOCKETS

!!ALL FOR ONLY \$445!!

MANUAL \$20 (CREDIT ON PURCHASE)
TV, COMPUTER, DISK SYSTEM, MIKE, JOYSTICK NOT INCLUDED

passed to the IOCS for processing. On simpler systems, an input-output interrupt may indicate that data is available from an input device or that an output device is ready to accept more data.

Buffer management is essential to the efficient use of computer systems, especially the larger ones. Buffering reduces the number of input-output hardware operations required to satisfy user requests and to correspond to the multi-byte physical record sizes on many types of devices.

Buffers are allocated in several different ways. An operating system may support one or more of them, although few support all. The simplest technique is the fixed, single-buffer allocation method used by Flex and CP/M for disk files. Its primary advantage is simplicity. Its primary disadvantage is that it eliminates the possibility of read-ahead or write-behind.

The next simplest technique, used by many multiprogramming operating systems, is double-buffering. In this case, the operating system can be filling or emptying the alternate buffer while the application program is processing the primary buffer. An extension of this method is fixed multiple-buffering, where more than two buffers are assigned to the files. The biggest advantage of multi-

ple-buffering is increased performance; the disadvantages are increased complexity and increased main storage requirements.

IOCSs support several means of transmitting data to and from the application program. The most common modes are called Move, Locate, Substitute, and Direct under MVS, but are used in many

*"High-level interfaces
provide facilities
far beyond those
on microcomputers."*

other operating systems without explicit names.

In Move mode, the application program provides the address and length of a work area containing data to be read or written to the IOCS. Flex and CP/M use this method for communication with the console, although the data length is restricted to one byte. OS/9, Uniflex and Unix use this technique exclusively. MVS supports this technique, among others.

In Direct mode, the application pro-

gram places or retrieves data directly in the buffer to be used in the input or output operation. Although it is the lowest-level mode, it is sometimes used even with large operating systems to increase performance, or for special devices. It is very often used with microcomputer operating systems such as Flex and CP/M.

The high-level interfaces used by the IOCSs on large mainframes provide facilities far beyond those now provided on minicomputers or microcomputers. MVS manuals call these high-level interfaces "access methods." Access types are termed "queued" and "basic," representing multi-buffered sequential access and single-buffered (potentially random) access. Data organizations are called "sequential," "direct," and "indexed-sequential," representing sequential files, random files, and special files with qualities of both sequential and random files. Most microcomputer IOCSs have very few different access methods. Flex and CP/M use basic sequential and direct methods, while OS/9, Uniflex, and Unix use basic sequential and direct, in addition to queued sequential methods.

Main Memory Management

Main memory management in a general-purpose computer system is a prob-



FIRST COAST SYSTEMS

EZTFR

- Easy file transfers
- .use with any modem
- .send any type of file:
 - text, BASIC, binary
- .protect with **CRYPTON**

CRYPTON

- File encryption system
- .protect any file
- .digraph cypher
- .hi-res lower case
- .send with **EZTFR**

For R.S. Disk systems: \$24.95 each; both on one disk for \$39.95

Be the first to solve CONTEST/TXT and **WIN \$200!**
CONTEST/TXT FREE on every disk until 12/31/84

FIRST COAST SYSTEMS

P.O. BOX 5396, Jacksonville, Florida 32207

Circle No. 156 on Reader Service Card

lem because the main memory is never large enough to satisfy all the demands on it. The operating system must also protect memory from damage due to accidental or malicious accesses by application programs. Allocation problems are aggravated when memory must be re-used.

Many overall memory management structures are now in use. Static memory allocation schemes were quite successful on some early systems, and are still used on some microcomputer operating systems. Examples of operating systems using static memory allocation are Flex, CP/M, and the Color Computer DOS. In these systems, programs are compiled and loaded into fixed memory locations and the operating system provides no system calls for allocation. As static memory allocation schemes are not generally conducive to multiprogramming or multiprocessing, almost all systems supporting multiprogramming or multiprocessing use some form of dynamic memory allocation.

Memory swapping was one of the first dynamic techniques used to solve the problem of insufficient memory. In memory-swapping, all memory assigned to a program is kept contiguous. At an appropriate time, the program's entire memory assignment is written to a direct-access device, and another program's entire memory assignment is read from a direct-access device, replacing the original contents. Then the new program is executed from its previous point of interruption.

The advantages of this technique are its simplicity and the partial memory protection it provides without any additional hardware. It can be put into place in a system with existing non-time-dependent programs without modifying the application programs. Unixflex uses disk swapping when there isn't enough memory for all tasks in a program, and memory block switching otherwise.

However, there are several disadvantages to this technique. The most obvious is the time required to transfer the program spaces to and from secondary storage. This problem can be lessened by using drums or large auxiliary memory for swap devices (they tend to be much faster than disks), or by hardware techniques (such as memory block switching) which avoid actual data transfers.

Another disadvantage is that much of the material transferred to or from the secondary storage may be superfluous, as programs almost never modify large amounts of storage in short periods of time.

A partial swapping technique is called *partitioning*. In this case, all of non-oper-

ating-system memory is logically divided into fixed-length pages. Only enough pages are swapped out to make room for new pages. Sometimes the hardware indicates whether a given page has been modified since it was swapped in, in which case it need not be swapped out.

The two major types of main memory allocation techniques are termed *contiguous* and *block*. The amount of memory requested of the operating system in a single call is often called a *segment*, and the hardware unit for memory allocation is a *page*, which may be of fixed or variable length.

*"The main memory
is never large enough
to satisfy all demands."*

In contiguous allocation, a segment is allocated on a page with size not less than the requested length. The allocated memory is a single contiguous address range. In block allocation, a segment is allocated to some number of pages, not necessarily contiguous. Then either the requesting task or the hardware must handle the non-contiguous nature of the allocation.

The basic problem in any dynamic memory allocation scheme is that the sequence of allocation requests almost never matches the sequence of de-allocation requests, leading to the problem of where to place a new segment when space for it is requested.

A method used on early large systems was to allocate memory at progressively higher addresses from the previous allocation and to de-allocate memory by compressing all higher allocations toward lower addresses. This method works only on hardware supporting position-independent program and data storage.

A form of memory protection often used on minis and micros requires no special protection hardware — the application programs simply cannot address other tasks' memory areas. Parts of the operating system and other systems programs may not be protected from access and modification by application programs, nor are program and data areas necessarily separate to protect an application program from destroying its own instructions. Some systems allow sharing across tasks on a read-only or execute-only basis.

Other forms of protection have been

used on mainframes. A common one is an address base-and-limit register pair or a base-and-length register pair. This idea provides position-independent program and data storage and prohibits accesses outside of the designated area. However, it totally prohibits any sharing among programs and does not protect a program from modifying its own instructions.

Secondary Storage Management

Secondary storage refers to all devices beyond main system memory that store information. All general-purpose computer systems have some form of secondary storage, and larger ones usually have several types of secondary storage.

Secondary storage methods include the following devices: bubble; cartridge tape; cassette tape; disk; drum; semiconductor memory; or tape. The disk devices support relatively fast, reusable storage and retrieval of large amounts of information. I didn't include cards, terminals, printer, paper tape, and communication devices in the list, since they do not provide reusable storage and retrieval of information. Other, newer devices, such as video disk, may be added to future lists.

Secondary storage devices can be categorized according to the following design or economic factors:

- Access mode — The order in which records are stored on and retrieved from a device. Usually, this is sequential or random.
- Capacity — The maximum number of bytes that can be stored on a device.
- Cost — The cost of the device itself and any media you need to use the device (tapes or disks).
- Data transfer rate — The speed at which data is transferred to and from a device. It is usually expressed in bits, bytes, or words per second.
- Latency time — The time delay between the instant the I/O request is received by the device until the instant the first byte is ready for transfer to or from the device. This delay normally has mechanical components, such as time needed for motor start-up or arm movement, and may also have physical components, such as rotational delays.
- Peculiarities — Particular methods in which a device must or must not be used, including physical parameters of devices, such as timing restrictions or number of tracks.
- Permanence — Whether data in a storage device remains when power is removed.

- **Physical record size limits** — The number of bytes in the largest and in the smallest group of information which may be stored on and retrieved from a device. If the low and high limits are the same, the recording mode is called fixed-length, and, if they are not the same, the recording mode is called variable-length.

- **Removeability** — Whether the media can be removed from the recording device, stored separately from the system, and replaced with additional media. Removeability increases the amount of potential storage space, but also complicates the operating system interfaces.

The ideal secondary storage device would be one in which the hardware imposes no unwanted structure on the IOCS attempting to use it. Of course, no storage device is ideal. However, many IOCSs use a virtual file interface, especially for random-access files, which acts as if the mass-storage device has no special structure. In this case, each device driver in the IOCS is responsible for interfacing this virtual file structure to the real file structure and device parameters.

The secondary storage management portion of an operating system is usually large and important. Within the category of secondary storage devices, the random-access devices (especially disk devices) are of special interest on most systems, since they are readily available and inexpensive.

Most secondary storage devices, and all major random-access devices, impose some structure in addition to the structure already present. In the classical file structure, a device holds at least one physical or logical volume of media (a disk, for example) containing at least one file. The file is a related collection of records, which are composed of fields, each of which is an adjacent group of bytes.

Many secondary storage devices, especially those with removeable media such as floppy disks, require the IOCS to automatically identify the contents of the disk.

Labels identify the volume and provide additional information, such as the time and date of creation and optional device parameters, such as capacity and density. Some IOCSs provide file security by recording and checking passwords in the volume label. They prevent accidental overwriting by recording and checking expiration dates.

For devices such as disks and tapes, the volume label is often recorded at a standard density. Most versions of Flex and OS/9 record track zero of all disks in single-sided, single-density mode for just this purpose. They both term it the "system identification record." Certain ver-

FILMASTR

A powerful DATA MANAGEMENT SYSTEM for the COLOR COMPUTER. If you have been wanting a really good data manager at a reasonable price, **THIS IS IT!** FILMASTR combines the best features of the big systems to provide a combination of speed, power, and simplicity that can't be beat.

CUSTOM SCREENS — Design input screens with up to 20 fields. Inverse labels for contrast.

FORM FILL ENTRY — Non-destructive blinking cursor, full screen editing, no garbage collections, copy fields from previous record. Keeps up with the fastest typist.

FAST SORT & SEARCH — Machine language sorts the entire file in seconds. Sort on any field or fields. Use a variety of relational search techniques to select any record or group of records that you can define.

EDIT FILES — Change or delete any record easily. Create and save sub-files or append files.

PRINT FORMAT — Print any field in any order on any line. Insert characters or phrases.

MENU DRIVEN — No special commands to be learned. All functions are menu selected and aided by on screen instructions.

CAPACITY — Up to 255 characters per record, 24000 characters per file. (9000 with 16K)

DOCUMENTATION — A thorough manual with examples and explanation of every command.

THE COMPUTER HOUSE

Box 1051 • DuBols, PA 15801 • (814) 371-4658

FILMASTR —	16K or 32K	TAPE	\$29.95
	EXT BASIC	DISC	\$34.95

Add \$2.00 Postage & Handling • C.O.D. \$2.00 Additional
PA Residents Add 6% Tax

Circle No. 13 on Reader Service Card



4791 Broadway, Suite 2F Dept. CM
New York, New York 10034

MORSE CODE TEACHER — Teaches the letters and numbers and gives practice to up to 5 wpm. Req. 16K ECB \$15/Cass
MORSE CODE TUTOR — Gives code practice up to 27 wpm. A must for upgrades \$15/Cass
HF ANTENNA DESIGN — Calculates dimensions of quads, dipoles, and Yagis, optimized for maximum gain. Req. 4K RAM \$10/Cass

GORILLA HI-RES MONITORS ~~

Green Screen.....	\$99
Amber Screen.....	\$109
BMC COLOR MONITOR w/ SOUND ..	\$299
COMPOSITE VIDEO ADAPTER.....	\$15
With purchase of monitor.....	\$5

Check or MO to CYNWYN. NY residents add sales tax.
3% shipping, \$2 minimum. SASE for catalog
or call (212) 567-8493

Circle No. 18 on Reader Service Card

— By Mail ★ College Degrees ★ By Mail —

■ Use Your C.C. or Other P.C. ■

To Earn a College Degree, in *Computer Sciences* or Any Other Subject Thru The Mail From *Major Universities* — Bachelors, Master's and Ph.D.'s Are All Available.

Report (Normally \$14.95) — Only \$9.95 Before May 1 st.

Send To — J & L Educational Consultants
3600 S. Harbor Blvd. Suite #244, Oxnard, CA 93030

— By Mail ★ Major Universities ★ By Mail —

Circle No. 68 on Reader Service Card

sions of OS/9, such as the one for the Color Computer, do not follow this practice, and are not able to directly process disks intended for other versions of OS/9.

Virtual disks have become a useful way to *speed up operation* by letting memory simulate disk devices. In this case the entire memory device may be used by application programs, not only by the operating system.

For random-access devices, such as disk drives, the list of file names (often called a catalog or directory) must contain the starting position of each file. It may also hold additional information about each file.

Here's a quick summary of file-name rules for several operating systems — you'll notice a tremendous variation among systems.

- Color-DOS — Non-hierarchical, file name of one to eight characters starting with a letter, optionally followed by a period or slash and a three-character suffix, and optionally followed by a colon and a drive number (zero to three).

- CP/M — Non-hierarchical, file name of one to eight characters starting with a letter, optionally followed by a period and a three-character suffix and optionally preceded by a drive letter (A to D) and a colon.

- Flex — Non-hierarchical, file name of one to eight characters starting with a letter, optionally followed by a period and a three-character suffix and optionally preceded by a drive number (zero to three) and a period.

- MVS — Hierarchical within volume, each segment of path of one to eight characters starting with a letter, with path segments separated by periods and total name length of one to 44 characters; device type provided by catalog or UNIT= parameter; volume name provided by catalog or VOLUME= parameter.

- OS/9 — Tree-structured, each segment of path of one to 29 characters starting with a letter, with path segments separated by slashes; first full path segment name must be device name.

- Uniflex — Hierarchical, each segment of path of one to 30 characters starting with a letter, with path segments separated by slashes; first full path segment name must be device directory name.

- Unix — Hierarchical, each segment of path of one to 14 characters starting with a letter, with path segments separated by slashes; first full path segment name must be device directory name.

Storage problems on random-access devices are only vaguely similar to those

of main memory management. Because of their size (or potential size) and structure, random-access devices are normally allocated not by byte, but at a higher level: sectors, groups of sectors, tracks, or cylinders. As the minimum allocation unit becomes larger, the allocation process becomes faster, but the potential wasted space also becomes larger.

The random-access file structures used by various operating systems differ widely. There are normally only two primitive file access modes: sequential and random. However, there are several basic structures based on the primitive file modes, and there are several major file structures built from the basic structures on larger systems. There are even variations at the lowest level, in terms of logical and phys-

ical record lengths supported, or the method of determining the successor of a given record when accessing a file sequentially.

Indexes were introduced to support higher-level file structures. An index provides indirect information about the contents of a file with random-access mode. Indices may themselves be files or portions of other files, so indices may point to other indices.

A common application of indices is to an indexed-sequential file structure. Record keys and pointers let you access the file sequentially by following the index links or randomly by searching the indices. Alternate indices can provide file sequences by other than the primary key, without modifying the original file.

Next: Color systems. ■ ■ ■

Generations of Systems

The Eniac was the first full-scale electronic digital computer. Although it was initially designed to calculate ballistic tables during World War II, it was not completed until 1946. It was designed as a programmable calculator, with no internal program storage.

It had 20 ten-digit complementary accumulators and three function tables each of 104 12-digit signed numbers. Punched cards were used for input, output, and temporary storage.

The Eniac could add two numbers in 200 microseconds and multiply two numbers in 3000 microseconds. This sounds slow, but it was 500 times faster than the next fastest digital computer of that time. Other contemporary computers were based on relay logic; many well-respected electrical engineers insisted the Eniac would never operate long enough without error to perform useful work.

Programs were initially wired into boards, becoming a temporary part of the machine's structure. During 1947, Dr. Von Neumann of Princeton University suggested a modification to the function table hardware that would change the Eniac into a primitive stored-program computer. This modification was installed and running by late 1948. It slowed the computer's internal operation, but it made programming so much easier that the old method (wiring boards)

was never used again. The Eniac was used until it was permanently decommissioned and disassembled in late 1955.

First-Generation Mainframes

Until 1959, digital computers relied on strictly sequential instruction execution, including input/output operations, which themselves were instructions. Vacuum tubes were the main logic unit.

Programmers worked at a console attached to the machine, loading paper tapes or decks of cards into the reader, setting registers, single-stepping programs with the registers, and interacting with the computer at the lowest levels. Programs were then written in absolute binary machine code. They were usually preceded by a loader which placed them into storage locations.

Programming aids were primitive. Eventually simple assemblers, interpreters, and much later, compilers were developed, but these methods were so cumbersome and time-consuming that experienced programmers spurned them in favor of binary, octal, or decimal machine code. Program changes were made in absolute machine code.

Organizations that required programmers to use and maintain pro-

grams in a form other than machine code found the programmers could no longer run the machines themselves. Specially-trained operators followed intricate procedures to successfully assemble or compile programs into machine code. The programmers could no longer debug their own programs, since the machine code produced by the interpreters and compilers did not correspond directly to the symbolic representation of the program.

The first generation of operating systems was developed to standardize input/output libraries and procedures, and to simplify the process of loading and executing assemblers, interpreters, compilers, and user programs.

Early operating systems were little more than *batch loaders*. After the operating system was loaded, the operator loaded decks of cards that held a user's programs and data. The operator then entered the name of the system program needed to process the program, or selected decks of cards representing the system programs. All along, the operator monitored the program to ensure it did not use too much time, paper, or cards. After each program, he gathered the decks and print-outs, and proceeded to the next deck.

Operating systems eventually became more independent — they could read control cards from program decks, eliminating the possibility the operator might hit the wrong key when requesting the operating system to process a deck. Unfortunately, the operating system remained unprotected from runaway programs, and an operator still had to monitor the progress of each program.

A major step during this period was the development of time-sharing operating systems. These were usually little more than multiple-user language interpreters. A few teletypes or other low-speed printing terminals were attached to the computer system. The facilities were primitive — each user only gained the power of a programmable calculator, at a very high cost. However, time-sharing systems brought the power of a computer directly into the laboratory for the first time, and allowed more than one user access to the machine at the same time.

The best part of time-sharing operating systems, as far as the users were concerned, was that the interpreter

provided meaningful diagnostics. As far as computer center management was concerned, the interpreter protected the operating system from runaway programs.

Second-Generation Mainframes

The second generation of computers occurred from about 1959 until about 1963. Transistors replaced vacuum tubes, so computer systems became smaller, ran cooler and more reliably, and had a much greater capacity. The systems also became more complex.

Fortran became the common language. IBM, the dominant force in the mainframe market, included Fortran in all its computers.

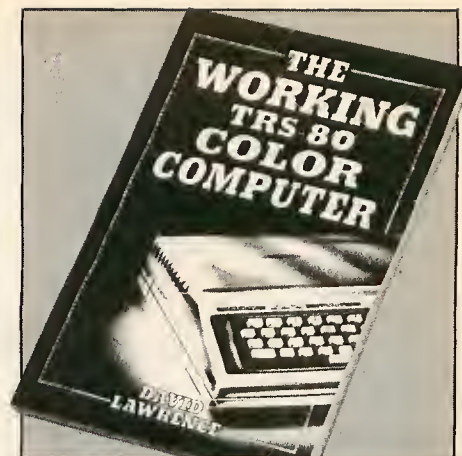
Fortran was normally used with an operating system that provided a standard library and some error handling. Universities extended these basic operating systems to facilitate batched operation, in which the Fortran compiler was resident. A series of small programs processed through it.

Batched operating systems simplified computer operation and vastly increased program turnaround time. Entire batches of programs were placed on magnetic tapes, the tapes were processed, the output was placed on tapes for printing, and the individual print-outs were decollated and distributed.

The most important hardware development during this period was the *data channel*, a hard-wired computer that controlled some communication between the CPU and memory and peripheral devices. When a data channel received a request from the CPU, it executed and controlled the operation asynchronously and independently of CPU operations, with as much overlap as possible, fetching and storing channel commands and data to and from main memory by stealing memory cycles from the CPU. It then reported its completion status by interrupting the CPU.

Complicated input-output routines were required to control these channels properly. The average programmer could no longer write input-output code and expect it to function properly. Reasonably sophisticated operating systems were developed to take advantage of the capabilities of data channels.

The concept of *interrupt* was extended to include conditions such as



A GOLD MINE OF PROGRAMS FOR YOUR COLOR COMPUTER

THE WORKING TRS-80 COLOR COMPUTER contains a wealth of programs on graphics, finance, music, data storage and games. You'll also find out how to turn your Color Computer into a rudimentary word processor, music and sound synthesizer, and household manager!

You'll progress quickly through each program which is explained in detail, and work with general-purpose subroutines and modules that can be used to write almost any program imaginable! Your gold mine is here—order your copy today!

**For faster delivery, PHONE TOLL FREE,
9 am-5 pm EST: 1-800-631-8112
(In NJ only 201-540-0445)**

Also available at your local bookstore and computer store.

CREATIVE COMPUTING PRESS

Dept. NU6C, 39 East Hanover Avenue
Morris Plains, NJ 07950

Please send me _____ copies of THE WORKING TRS-80 COLOR COMPUTER at \$9.95* each plus \$1.50 postage and handling (\$4.50 outside USA) each. #65-8

Payment Enclosed \$_____ *Residents of CA, NJ and NY State add applicable sales tax.

Charge My: ☐ AmEx ☐ Visa ☐ MC

Card No. _____

Exp. Date _____

Mr./Mrs./Ms. _____
print full name

Address _____

City _____

State/Zip _____

☐ Please send free catalog.

TEACH YOUR KIDS HOW TO USE THE TRS-80... EASILY!



Now you can teach your children how to use the TRS-80 without getting lost in the user manual...without spending hours demonstrating the simplest functions...without the fear that they'll damage their computer because they don't know how to use it!

COMPUTERS FOR KIDS TRS-80 Edition teaches children ages 8 and older to write their own programs in less than an hour—without previous knowledge of algebra, variables or computers! There's also a special section that keeps parents and teachers on the same successful command path.

Beginning with an easy-to-understand explanation of how to use the TRS-80, readers will progress quickly to flow charts and simple print programs to loops, graphics and other programming concepts—demonstrating exactly how to make the computer do what they want—in simple non-technical language.

Join the thousands of parents and children who have learned computing with COMPUTERS FOR KIDS—Order your copy today!

**For faster delivery,
PHONE TOLL FREE
9 am-5 pm EST: 1-800-631-8112
(In NJ only 201-540-0445)**

Also available at your local bookstore or computer store.

CREATIVE COMPUTING PRESS

Dept NUC, 39 East Hanover Avenue
Morris Plains, NJ 07950

Please send me _____ copies of COMPUTERS FOR KIDS TRS-80 Edition at \$5.95* plus \$1.50 postage and handling (plus \$4.50 outside USA). #12-H.

Payment Enclosed \$_____. * (Residents of CA, NJ and NY State add applicable sales tax.)

Charge My: (\$10. minimum)

☐ Amex ☐ Visa ☐ MC

Card No. _____ Exp. Date _____

Mr./Mrs./Ms. _____
print full name

Address _____

City _____

State/Zip _____

☐ Please send free catalog.

arithmetic overflow and underflow, processing too long, and system calls. However, memory protection was not normally available, and system crashes caused by program or system error were common and hard to trace.

Program libraries became more sophisticated. Sort generators and peripheral copy programs became commonplace and were often considered part of the operating system, as were additional language processors. Direct-access devices replaced magnetic tape as storage. Traffic to the direct-access devices was normally sent through the operating system; volume directories and access methods were developed to help the operating system control these devices.

Third-Generation Mainframes

From 1962 until 1969 multiprogramming established itself securely on large mainframes, and time-sharing remote access displaced batch access. Large, fast, direct-access disk devices provided on-line storage for operating systems, application programs, and application data files. Integrated circuits reduced the computer's size, complexity, and power requirements, and increased speed and capacity.

Memory protection hardware and the software to control it supported the multiprogramming environment. Most mainframes had a special set of instructions for input-output operations and for controlling the memory protection hardware. This set of instructions was almost always restricted to execution by the operating system to control accidental or malicious misuse of the computer system. Sophisticated internal accounting systems tracked computer use by each operator.

Hardware memory relocation schemes appeared on more sophisticated systems, allowing *dynamic* or *virtual* memory systems in which the amount of memory attached to a system can greatly exceed the addressing capacity of the CPU. Multiprocessor systems also became more common, requiring enormously complicated operating systems.

IBM's all-encompassing OS/360 became the most common operating system for large mainframes, and its descendants remain popular to this day. OS/360 never supported virtual memory or multiprocessing, but it did support multiprogramming and mul-

titasking on IBM 360 hardware.

Towards the end of this generation, operating systems were recognized as a central part of new computer systems, and thus a central part of software engineering and computer science. E.W. Dijkstra published a series of articles from 1965 to 1969 codifying the theory of concurrent processing control. Dijkstra is better known for a 1968 letter to the editor of the *Communications of the ACM*. He criticized the use of GOTO statements as bad practice, and said they made programs in general impossible to mathematically prove correct.

Fourth-Generation Mainframes

After 1969, Large Scale Integration (LSI) and then Very Large Scale Integration (VLSI) replaced the simpler integrated circuits. Mainframes then shrank in size and power requirements, and grew in speed and internal and external capacity.

Vast, relatively inexpensive, fast, direct-access disk drives with capacities of hundreds of millions or billions of bytes became available. It became practical for many large data files to be available as database files, establishing the usefulness of on-line systems.

IBM finally embraced virtual memory and multiprocessing, and made them integral parts of its hardware and software. IBM also continued to increase the real main memory available. The original limits were almost all far below the architectural maximum of 16 million bytes. Several of the larger CPUs were made capable of the maximum amount, but when the demand for even larger address spaces became great enough, IBM announced XA (extended architecture) with architectural limits of about a billion bytes of main memory.

One major advance of this period is the ability to extend a mainframe's power to remote sites. IBM's products are designed according to an overall plan, called Systems Network Architecture (SNA). SNA will eventually replace all individual communications protocols. IBM has integrated SNA into its operating systems so well that a user at a terminal attached to one computer system may be using programs and data on several other major computer systems without being aware of the fact.

■ ■ ■



SUMMER MELTDOWN SPECIALS

SKYLINE'S BIG 10

Cheshire Cat	
Graphicom (64K disk)	\$29.95
Cognitec	
Telewriter 64 tape	\$49.95
Telewriter 64 disc	\$59.95
Custom Software Engineering	
Graphic screen print, specify printer	\$ 9.95
Eigen Systems	
Colorcomm/E, disk or cart.	\$49.95
Stripper	\$ 7.95
CCEAD	\$ 6.95
BASIC Aid cartridge	\$34.95
Micro Works	
Macro 80C Editor/Assembler	\$99.95
SDS 80C Editor/Assembler	\$89.95

SKYLINE'S OWN BEST SELLERS

SUPERSTATS

The most powerful statistics program available for the CoCo. Used by professionals. 16K Ext. Basic. Tape \$29.95

PAGEPLUS

Gives 64K from Basic. New revised documentation! Disk \$29.95 Tape \$27.95

STRUCTURED MACROS

Macro 80C super enhancement! Disk \$19.95

SETUP 64

Allows double-sided 40/80 track drives! \$19.95

MDISK

Sets up an internal 32K memory disk for rapid storage and retrieval. Source code included. Disk \$29.95 Tape \$27.95

ROMBACK

Why pay more? Allows dumping from ROMpak to disk or tape. Full documentation, easy to use. Lowest price! Tape \$16.95

QUICKSORT

M/L sort routine for easy use by Basic programmers. Works on tape or disk. 16K. Tape \$12.95

64K BOOT/PAGER

This is what you need to get the most from your 64K CoCo. Super buy! 64K Req. Tape \$19.95

SIMPLEX

Programmers — this is a must! This powerful tool will save you time and effort. Min. 16K Ext. Basic. Tape \$29.95

C.C. FILE

Flexible data base manager. 16K. Now only \$12.95

C.C. WRITER

You can pay more — but will it be better? 16K. \$29.95

C.C. CALC

Powerful spreadsheet for your CoCo! 32K. \$34.95

C.C. MAILER

Handles all you mail list needs! 16K. \$19.95

C.C. Three

You save \$27.90! C.C. File, Writer, and Calc in one fantastic package. We'll even give you both tape and disk versions (one tape) for one low price — \$49.95

OUR CUSTOMERS SOUND OFF FOR SKYLINE!

I would like to express my appreciation to you for the excellent service provided by your company.... I was delighted to receive my shipment only one week after the phone order. Hats off to your shipping department.

Once again, thank you for your prompt and efficient service, and for providing such a great package at a good price.

D.S., Kentucky

...You might care to know that this order is repeat business. Recently, I purchased a NEC monitor package from your firm and I was very pleased with your fast service, the quality of merchandise and the ease of set-up.

M.S., California

\$60 Software Bonus With Memory Upgrade

That's right — Skyline's famous 64K Upgrade is an even better deal than before! 8 guaranteed 200 n.s. 64K memory chips, solderless installation instructions (one solder connection required on Color Computer 2), Skyline's 64K BOOT and PAGER programs, PLUS the Wizard 64 adventure game, PLUS a handy new utility, SETUP64 (allows you to configure your tape or disk system in a myriad of ways)! Still only \$59!! Order now — this offer may be withdrawn at any time!

ATTENTION ADVENTURE FREAKS!

MYSTIC MANSION



You can stay cool in front of your air conditioner, but can you keep your cool while playing Skyline's exciting ALL GRAPHIC ADVENTURE? One of the best yet! 32K Disk only.

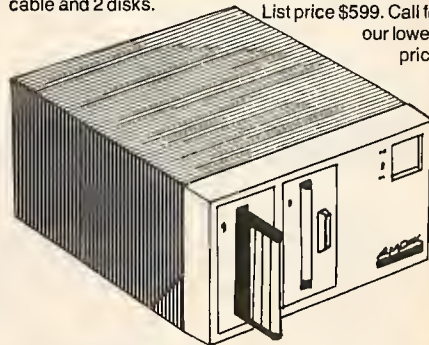
Summer Special \$29.95

HARDWARE — SKYLINE has the BEST for LESS! Call us LAST!

LESS = MORE

with the Amdek 3" Disk Drive. You get more data stored on a 3" disk than a 5¼" and the AMDISK III B takes up less space. AMDISK III B 3" dual drive with cable and 2 disks.

List price \$599. Call for our lowest price!



TIRED OF RF INTERFERENCE?

Poor resolution? We carry a complete line of B/W and color monitors from AMDEK, NEC and SYNCO. We also have the right monitor adapter to match your CoCo. Call for FRIENDLY SERVICE!

SKYLINE PRINTER SALE! STAR MICRONICS — OKIDATA — TRANSTAR — JUKI — NEC You want it? We've got it!

GET ON LINE!

Modems from Hayes and NEC. Call for latest prices.

NOW AVAILABLE!

Skyline's Risk-Free diskettes and data cassettes — so good that they're guaranteed for as long as you own them!



"No Bull"

10 diskettes, sleeves, labels, and write protect tabs — \$19.95
12 data cassettes, boxes, and lables — \$8.00



UPS C.O.D. order gladly accepted, \$2.00 additional.

We Love Canadian Orders!
Inquire For Foreign Shipping

FAST ORDER LINE (312) 286-0762
24-HR MODEM ORDER LINE
(312) 286-9015

ORDERING INFORMATION

*\$10 shipping, handling & insurance on printers. Amdisk, and monitors. \$5 on modems, \$2 on all other orders. All prices U.S. funds.

Skyline Marketing Corp. 4510 W. Irving Park Rd. Chicago, IL 60641

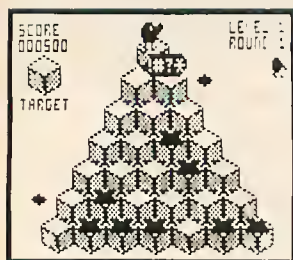
FREE GIFT

Use of our order forms qualifies you for a free gift with your order. Get on our mailing list now for order forms.

COUPON

NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____
Dept. C

THE TOP 4 COCO GAMES...

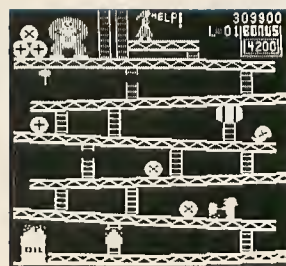


CUBIX

By Spectral Associates. Very much like the arcade smash! Jump little Cubix around the 3D maze trying to change the color of all the squares. With Death Globes, Discs, Snakes, etc. 32K Tape: \$24.95

ZAKSUND

From Elite Software comes this fantastic arcade style space action game with 3 different stages of moving 3-D graphics. You've never seen anything like this on your CoCo! Great sound too! 32K Tape: \$24.95

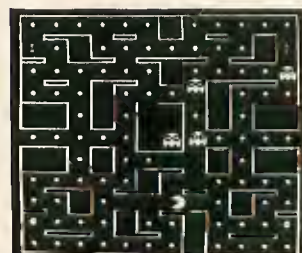


THE KING

Previously called 'Donkey King', you simply cannot buy a more impressive game for your CoCo. With 4 different screens and loads of fun! From Tom Mix Software. 32K Tape: \$25.95

GHOST GOBLER

From Spectral Assoc. This "PAC" theme game has been improved several times. It is definitely the best of its type. Brilliant color, action and sound, just like an arcade. 16K Tape: \$24.95



COLORCADE SUPER JOYSTICK MODULE



ONLY \$19.95

JOYSTICK INTERFACE/RAPID FIRE/6 FT. EXTENDER ALL IN ONE! The Colorcade allows connection of any Atari type joystick to your CoCo (including the Wico Red Ball). These switch type sticks are extremely rugged and have a faster and more positive response. They will improve the play of almost any action game.

An adjustable speed rapid fire circuit is built in. Press your fire button and get a great burst of fire instead of just a single shot! You get a real advantage in shooting games that do not have repeat fire.

ATARI JOYSTICK

ONLY
\$8.50



THE BEST YOU
CAN BUY
WICO #15-9730

~~\$34.95~~
\$29.95



WICO FAMOUS
"RED BALL"

ROM/PROJECT/ PRODUCT CASE



Give a professional look to your project or product! High quality 3 piece injection molded plastic with spring loaded door. Designed especially for the CoCo ROM slot.

2 - 4 pcs. \$5.50 Ea.
5 - 9 pcs. \$3.50 Ea.
10 - 99 pcs. \$2.75 Ea.
100 & UP. Call Us
P.C. board for 27XX EPROMS. . . \$4.00 Ea.

COLORWARE LIGHT PEN



ONLY \$19.95

WITH SIX FREE
PROGRAMS ON
CASSETTE!

The Colorware Light Pen plugs directly into your joystick port and comes with six fun & useful programs on cassette. Easy instructions show how to use it with Basic and it's compatible with light pen software such as Computer Island's "Fun Pack." Order yours today. Only \$19.95 complete.

TELEWRITER-64



DISK \$59.95
CASSETTE... \$49.95

Colorware researched the word processors available for the Color Computer. This is the best. Telewriter-64 is a truly sophisticated system that is marvelously easy to use. It works with any 16K, 32K or 64K system and any CoCo compatible printer.

TOP-RATED COCO WORD PROCESSOR

TOLL FREE ORDERING
800-221-0916

ORDERS ONLY. N.Y. & INFO CALL (212) 647-2864



'REAL TALKER'

HARDWARE Voice Synthesizer

NEW from
COLORWARE..
only...\$59.95

THINKING OF BUYING A
COCO VOICE SYNTHESIZER?
READ THIS....

Making your computer talk couldn't be any easier! 'Real Talker' is a full featured, ready to use, HARDWARE voice synthesizer system in a cartridge pak. It uses the Votrax SC-01 phoneme synthesizer chip to produce a clear, crisp voice.

FREE TEXT-TO-SPEECH

Included free with 'Real Talker' is Colorware's remarkable Text-to-Speech program. This is a truly powerful machine language utility. What it does is automatically convert plain English to speech. And it has an unlimited vocabulary! For example, use it in the direct mode: Type in a sentence or a paragraph, even mix in numbers, dollar signs, etc., then press enter. The text is spoken. At the same time a phoneme string is generated which can be saved to cassette or disk, modified or used in a Basic program.

We originally planned to sell this major piece of programming for about \$40.00 but decided it was so useful that no 'Real Talker' user should be without it. Besides, it really shows off the capability of 'Real Talker'.

Also included with 'Real Talker' is our unique Phoneme Editor program. It allows you to explore and create artificial speech at the phoneme level. Phonemes are the fundamental sounds or building blocks of word pronunciation. There are 64 different phonemes, as well as 4 inflection levels at your disposal. Creating and modifying speech at the phoneme level is both fascinating and educational. The Phoneme Editor may also be used to customize the pronunciation of speech produced by the Text-to-Speech program.



You don't have to use any of our utility programs though. If you write your own Basic Programs, you will find the pocket sized Votrax Dictionary (included free) is all you need to make your own Basic programs talk. This dictionary gives you quick access to the phoneme sequences used to create approximately 1400 of the most used words in the English language.

How about compatibility? 'Real Talker' is compatible with any 16K, 32K, 64K, Extended or non-extended Color Computer. It works with any cassette or disk based system, with or without the Radio Shack Multi-slot expander. No other synthesizer under \$100 can make this claim. Most other CoCo voice synthesizers require an expensive Multi-slot expander in order to work with the disk system. 'Real Talker' requires only an inexpensive Y-adaptor. This is an important consideration if you plan on adding a disk or have one already.

'Real Talker' comes completely assembled, tested and ready to use. It is powered by the CoCo and talks through your T.V. speaker so there is nothing else to add. Price includes Text-to-Speech and other programs on cassette (may be transferred to disk), User Manual and Votrax Dictionary. ONLY \$59.95

'Y-BRANCHING CABLE' For disk systems. This 40-pin, 3 connector cable allows 'Real Talker' to be used with any disk system \$29.95

YOU DECIDE....

Order yours today on our Toll-Free Order Line. If you are not delighted with your 'Real Talker' system, simply return it within 30 days for a prompt, courteous refund.

COLORWARE

COLORWARE INC.
78-03A Jamaica Ave.
Woodhaven, NY 11421
(212) 647-2864



★★★ ORDERING INFORMATION ★★★

ADD \$2.00 PER ORDER FOR SHIPPING & HANDLING.
C.O.D.'S: ADD \$3.00 EXTRA.
SHIPPING & HANDLING FOR CANADA IS \$4.00
WE ACCEPT VISA, MASTER CARD, M.O.'S, CHECKS.
N.Y. RESIDENTS MUST ADD SALES TAX.

The HJL-57 Keyboard



Compare it with the rest. Then, buy the best.

If you've been thinking about spending good money on a new keyboard for your Color Computer, why not get a good keyboard for your money?

Designed from scratch, the HJL-57 Professional Keyboard is built to unlock ALL the potential performance of your Color Computer. Now, you can do real word processing and sail through lengthy listings...with maximum speed; minimum errors.

At \$79.95, the HJL-57 is reasonably priced, but you can find other CoCo keyboards for a few dollars less. So, before you buy, we suggest that you compare.

Compare Design.

The ergonomically-superior HJL-57 has sculptured, low profile keycaps; and the three-color layout is identical to the original CoCo keyboard.

Compare Construction.

The HJL-57 has a rigidized aluminum baseplate for solid, no-flex mounting. Switch contacts are rated for 100 million cycles minimum, and covered by a spill-proof membrane.

Compare Performance.

Offering more than full-travel, bounce-proof keyswitches, the HJL-57 has RFI/EMI shielding that eliminates irritating noise on displays; and four user-definable function keys (one latchable), specially-positioned to avoid inadvertent actuation.

Free Function Key Program

Your HJL-57 kit includes usage instructions and decimal codes produced by the function keys, plus a free sample program that defines the function keys as follows: F1 = Screen dump to printer. F2 = Repeat key (latching). F3 = Lower case upper case flip (if you have lower case capability). F4 = Control key; subtracts 64 from the ASCII value of any key pressed. Runs on disc or tape; extended or standard Basic.

Compare Installation.

Carefully engineered for easy installation, the HJL-57 requires no soldering, drilling or gluing. Simply plug it in and drop it right on the original CoCo

mounting posts. Kit includes a new bezel for a totally finished conversion.

Compare Warranties.

The HJL-57 is built so well, it carries a full, one-year warranty. And, it is sold with an exclusive 15-day money-back guarantee.

Compare Value.

You know that a bargain is a bargain only so long as it lasts. If you shop carefully, we think you will agree...The HJL-57 is the last keyboard your CoCo will ever need. And that's real value.

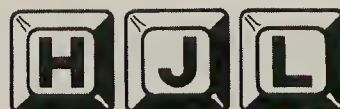
Order Today.

Only \$79.95, the HJL-57 is available for immediate shipment for either the original Color Computer (sold prior to October, 1982) or the F-version and TDP-100 (introduced in October, 1982), and the new 64K CoCo. Now also available for CoCo 2.

Order by Phone Anytime

716-235-8358

24 hours, 7 days a week



PRODUCTS INC.

955 Buffalo Road • P.O. Box 24954
Rochester, New York 14624

Ordering Information: Specify model (Original, F-version, or CoCo 2). Payment by C.O.D., check, MasterCard or Visa. Credit card customers include complete card number and expiration date. Add \$2.00 for shipping (\$3.50 for Canada). New York state residents add 7% sales tax. Dealer inquiries invited. For dealer information in Eastern U.S. and Canada, call collect: 617-586-7614, Advanced Computer Services (distributor), 74 Plain Street, Brockton, MA 02401.

Circle No. 33 on Reader Service Card

EXTRA **Candy Times** EXTRA

VOL. 1 — NO. 1

CAMDEN, ME JULY 4, 1984

PRICE 30 CENTS

NEW WORLDS WAITING!

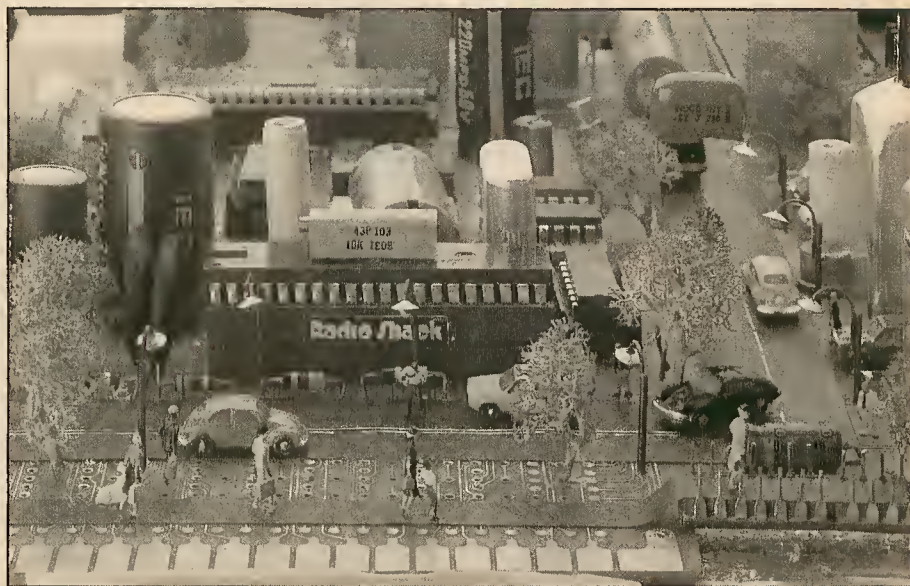
GRUNBY GREET'S CP/M

CP/M, ONE OF THE GRANDADDIES of microcomputer operating systems, is here. Why, you may ask, do we need another operating system? Because CP/M has given rise to a wealth of commercial and public domain software over the years, and estimates of the number of available software packages range from 5000 to 15,000. That's why.

The acronym "CP/M" means different things to different people. Many computerists believe it stands for "control program monitor." Others say it stands for "computer programs for microprocessors." According to Digital Research Inc., the Silicon Valley firm that originally wrote CP/M, it means "control program microprocessor."

Like all disk operating systems, CP/M simplifies computer use and improves productivity. Service functions for the management of disk files and establishment of application programs are provided. For uniformity's and compatibility's sake, the CoCo Coupler, which is licensed by Digital Research, preserves CP/M's standards and conventions. The best way to appreciate what Wayne Technology (from here on, let's just call the company "Wayne") has done is to become familiar with CP/M's background.

Back when the 8080 and eight-bit Z-80 micros were sweeping the data processing world is when CP/M came out, and it's on those chips, and their relatives, that CP/M is based. During the same era the eight-inch floppy disk became commonplace for random access, removable storage. Digital recognized the value of that medium and kept disk functions in mind during the design of CP/M. Many characteristics of CP/M have remained virtually unchanged over the years. Modernization of CP/M operating system concepts are in progress but changes are evolutionary, not revolutionary. Generally, later versions will accept software developed under earlier versions. There



CP/M reported to open the Color Computer to entry and use of visitors from other micro worlds.

is, of course, a constant struggle between compatibility and innovation. Different versions of CP/M exist because they acknowledge different chips. Originally, CP/M used the single-sided, single-density, eight-inch floppy disk as a standard device type. Even though this is still the standard recognized by CP/M for removable storage, 5-1/4 inch disks are now more common. The CoCo Coupler 1 stores information on 35, 40 and 80 track 5-1/4 inch disks.

Most screens display 80 columns and 24 rows. These customary dimensions are usually expected by CP/M applications. Yet some displays are not as great, as Color Computerists know, but Wayne's taken that into account and has incorporated the larger display.

CoCo Coupler

Wayne Technology
Box 5196 Anaheim, CA 92804
(714) 772-5757
64K
\$250

NEW COLOR OUTLOOK

The CoCo Coupler 1 contains a four-megahertz Z80A microcomputer chip in an adapter that plugs into the cartridge port. The adapter is housed in a trim, black, anodized aluminum case that also functions as a radio frequency shield. The edge connector on the cartridge port is gold-plated for reliability. Since use of the adapter requires removal of the disk controller, another connector for the controller has been provided on the opposite end of the adaptor case. The overall length of this combination is about 10 1/2-inches.

Stability is ensured by an L-bracket beneath the unit. Wayne has a 90-day warranty on the adaptor and will replace master disks that have been damaged in shipment.

With the adapter installed, your Color Computer will show you a new side. The menu asks whether to boot up with CP/M or Basic. When in the CP/M mode a boot routine in the adapter will load CP/M from a disk in Drive 0. When in Basic

all customary functions of the Radio Shack Disk Extended Basic operating system are there just as though the adapter was not connected. You can boot Flex or OS/9. While using Flex and OS/9, the only noticeable new behavior is that hitting the Reset button will make you go back through the master menu instead of boot-up.

SOFTWARE ON DISK

Software for CP/M 2.2, the version of CP/M in the CoCo Coupler 1, is supplied on disk. The disk contains a loader for the operating system, a memory image of the operating system, and a set of utility programs.

To understand how Digital Research's and Wayne's software work together, first understand the events that lead to the execution of the text editor.

After the selection of CP/M from the menu, the loader completes the bootstrap operation begun by the Coupler. The loader has no function other than to read sectors from track 0 and 1, where the image of the operating system resides, and to store this information (instructions and data) into memory. It then transfers control to CP/M. Next, CP/M performs whatever I/O initialization is necessary and puts the A> prompt on the screen. This prompt means drive A (Drive 0) will be used for all implied references to a drive and that CP/M is awaiting command input from the console. The command for calling the text editor is ED. After it's entered, it is examined for validity by a console command processor and loaded. Since the text editor resides on disk, the command processor must find it in drive A under the file name ED.COM and arrange for it to be loaded into memory. ED is then given control and asks for the first line of input.

The text editor sequence uses a bootstrap loader and elements of CP/M. The loader and all software elements designed explicitly for the Color Computer are products of Wayne Technology, as all elements of CP/M independent of the particular computer they run on are products of Digital Research. The following list identifies the origin of these software modules and summarizes the functions of each.

- The bootstrap loader uses the disk controller to read CP/M from Drive A.
- The console command processor (CCP) is independent of the computer type. It is active when CP/M is waiting for command information. The com-

mand line is examined for proper format and decomposed into fields for interpretation. The CCP also contains a number of built-in commands: <drive name>: changes the default drive to A, B, C, or D; DIR gives a directory of file names; ERA erases a file(s); REN renames a file; TYPE displays file contents; SAVE names a block of memory and transfers it to a file; and USER changes an implied numeric prefix to a file to partition a directory.

All other commands, (such as ED) are expected to be on disk. The CCP arranges for these to be loaded into memory. In fact, CCP will allow itself to be overlayed since the new command is given complete control.

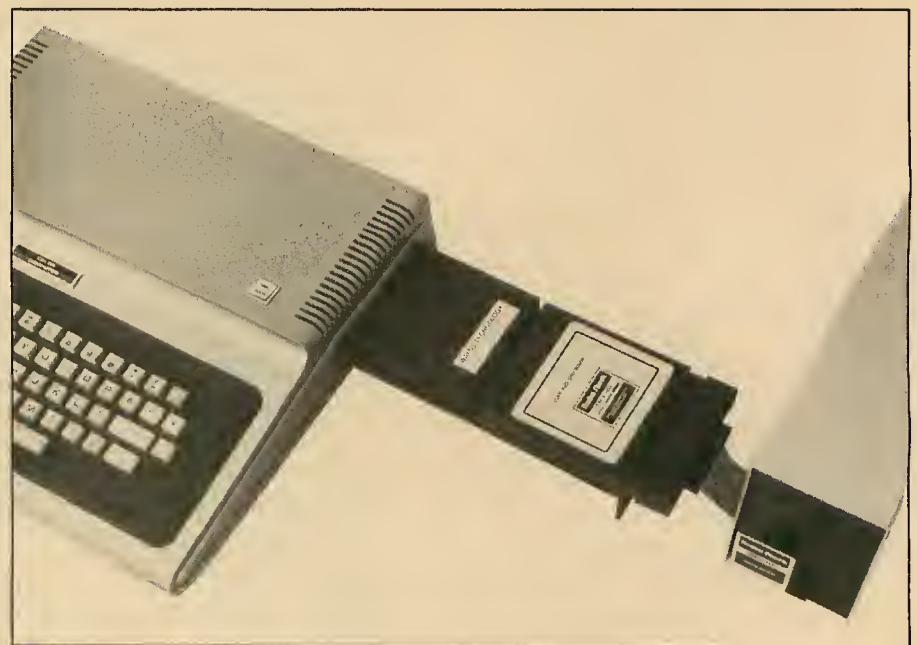
- The Basic Input/Output Systems (BIOS) contains the logic and software for communications between CP/M and the outside world. BIOS has been carefully tailored for Color Computer hardware. It addresses the serial I/O port, disk controller, keyboard, and the screen. It implements important details like I/O timing, error recovery, and device status.

- The Basic Disk Operating System (BDOS) is the common interface to the applications programs and utilities. BDOS contains over 40 service functions, functions for transferring bytes or records to or from an I/O device, functions to manipulate file directories, and management services. When BDOS must obtain data from a specific device, it calls on BIOS to accomplish the actual transfer. In this way, BDOS is independent of particular hardware — in our case, the Color Computer.

These software elements occupy memory at locations that were pre-defined by Digital Research. These address definitions are collectively called a memory map. Applications that run under CP/M 2.2, and previous versions, expect to find the same memory map regardless of the computer system. An application written for another computer can generally be run on the Color Computer because these address conventions have been followed.

There are two other areas in the memory map, the Transient Program Area (TPA) and Page 0. The TPA is where all application programs and utilities execute. Page 0 contain assembly language instructions and data for the operating system's own purposes. From low-numbered memory locations to the top of memory, the areas in sequence are Page 0, the TPA (which is where the CCP actually resides), the Basic Disk Operating System, and the Basic Input/Output System. Since the CCP is not required once a program is executing, its space is considered free for use and may be overlayed. After execution the CCP is restored.

Digital Research also provides transient, as opposed to built-in, commands that are on the Wayne disk. ASM is the assembler for the 8080 and the Z80A. DDT, the Dynamic Debugging Tool, tests, changes, and diagnoses machine code programs. DUMP displays the contents of a disk file in hexadecimal format. ED is the standard line editor for CP/M. LOAD converts an ASM file for use as a transient command. PIP, the Peripheral



Wayne's CP/M plugs into the ROMpak port.

Interchange Program, moves files from one medium to another. STAT provides status information about devices and allows changes to read/write protection attributes. SUBMIT gets command line calls from a file instead of the keyboard. SYSGEN places a copy of CP/M onto a new disk to make it a system disk. XSUB selects a file, rather than the keyboard, as input to an executing program.

Six utilities and two features have also been specially written for the Color Computer. Each interacts with CP/M to provide services that depend on the Color Computer environment.

- Setup controls the use of lowercase and allows selection of the rate at which characters are sent to the printer. Both uppercase-only mode and shifting of the character case with the shift key are allowed. The baud may be changed to anywhere from 110 to 9600 bits per second.

- Video80 formats the screen for 80 columns by 24 rows. Much CP/M software expects 80-column capability, but Video80 does not actually produce 80 columns, nor does it produce true lowercase characters. Without it the default size of the screen is the old 32 columns by 16 rows, complete with wrap-around. Video80 uses this size as a window view within the larger logical display. Control keys shift the actual view within the larger display. A Clear/Up-Arrow keystroke positions the window to the top left sixteen lines. A Clear/Down-Arrow keystroke shows the bottom left sixteen lines. Clear/Right-Arrow shifts the window horizontally. Depressing any letter key positions the window back to the top left sixteen lines, restores the cursor to its original position, and lets the CCP process input. If CP/M is presenting a stream of lines, horizontal scrolling will take place automatically when needed. Every time a line exceeds 32 columns, Video80 shifts the window view to the right so the extended columns are displayed as they are generated. The screen scrolls from top to bottom, from left to right, and back again; the display is positively dazzling.

- Wordpak is a commercial (PBJ, Inc.) program for a particular hardware cartridge that offers a full 80-column by 24-row display, true lowercase, and inverse video. To use it, you'll need a multipak interface. (Wayne has run successful tests using a Y-cable to bypass the need for the interface, but warns that doing so yourself exceeds specifications.) This Wordpak utility implements the display that is expected by much existing CP/M

software and, in effect, places the Color Computer squarely in competition with computers built solely for serious applications.


- Config specifies or changes the configuration of disk drives. It tells CP/M to recognize Radio Shack's 35 tracks or the 40- and 80-track formats available on competing drives. Config also is used to select the printer baud and voltage polarity.

- Transfer is a communications program that is designed for a 300 baud modem (and, of course, a telephone). It is not designed for interactive communications since none of the characters it receives are echoed to the screen. It allows only the transfer of files between two computer systems. As such, a little voice coordination must be used to ensure that both Transfer and the remote computer are ready before data is sent. Transfer expects a format of eight data bits and no parity bit. It is compatible with the protocol of the public domain software package called Modem.

- For all screen formats, CP/M 2.2 features controls that emulate the functions of the commonly-used Lear Siegler ADM-3A terminal. The ADM-3A functions position the cursor about the screen, and clear it. The Clear key serves as the CP/M control key, and Shift/Up-Arrow is the escape key. Only those packages that recognize ADM-3A controls will work with Wayne's CP/M.

- The Phantom drive feature, as its name suggests, indicates that an extra drive is simulated by the operating system. More correctly, it uses memory as a temporary exchange medium to copy files between disks. On a system with one drive this is the only way to transfer files or to back up a disk. Using Phantom requires endurance. Source and destination disks must be alternately placed in the drive until all sectors have been transferred.

The Coupler comes with version 1.1 of the user's manual published in December, 1983. It's only 22 pages long and, unfortunately, could be a lot better. While a comprehensive manual would have substantially upped the product's price, the cost cutting measure has resulted in documentation that offers only the briefest of explanations. The Digital Research manual itself is 250 pages long, but copyright costs prevented Wayne from incorporating it, Wayne says. Users can turn to Digital Research or other sources for documentation needs. Osborne/McGraw Hill, at 2600 Tenth Street, Berkeley, CA 94710, is one such source.



HARDWARE

**ATTENTION
COLOR COMPUTER USERS**

D.I./D.O. CARD \$59.95
(DIGITAL INPUT / DIGITAL OUTPUT)

Applications: Process Control,
Security Systems
and Robotics.

Controls external relays, circuits,
etc. Plugs into CoCo Cartridge
Connector. Provides 8 D.O. points
capable of sinking 1.5A. Features
an L.E.D. on each D.O. point to
indicate ON/OFF state, fully de-
coded address and heavy duty
drivers. A second port is program-
mable for 8 D.I. or 8 D.O. Allow
1 to 3 weeks delivery. Include
\$3.00 for postage and handling.
Send check or money order or write
for more information to:

ITI
P.O. Box 235
Levittown, PA 19059

EASY TO USE - 30 DAY WARRANTY

Circle No. 150 on Reader Service Card



THE POPULAR DETECTIVE GAME
NEVER GROWS OLD! HAS A NEW
CRIME-NEW SUSPECTS-NEW
SCENE-NEW WEAPON-NEW CLUES
EACH TIME IT IS PLAYED!
16K EXT. TAPE \$21.95



TRIVIA

AMERICA'S FAVORITE PARTY
GAME WITH A FEW TWISTS.
16K 1 TO 4 PLAYERS
32K 1 TO 8 PLAYERS
16K EXT. TAPE \$19.95
32K TAPE \$24.95



GURU

COCO'S POPULAR ARTIFICIAL
INTELLIGENCE EXPERIENCE
YOUR OWN PERSONAL GURU!
16K EXT. TAPE \$21.95



DIETITIAN

CONVERTS FOOD INTO
CALORIES-KEEPS TRACK OF
YOUR CALORIE INTAKE, BY
THE MEAL, THE DAY, THE
WEEK, ETC.
16K EXT. TAPE \$21.95

DIETITIAN II
AS ABOVE WITH OPTIONAL PRINTER ROUTINE AND
FAST FOODS BY BRAND NAMES. 32K TAPE \$29.95

 **SHIPPING PAID** 

NORTHGLENN SOFTWARE COMPANY

BOX 33113
NORTHGLENN, CO. 90233
(303) 451-0647

Circle No. 44 on Reader Service Card

NOW AT LAST!

A check writing program for your color computer at an affordable price ... save time and effort each month ... all you do is sign the check ... place in a "windowed" envelope ... stamp and mail ... it's easy.

Features:

- Menu driven
- Complete screen prompts
- Print checks from data statements
- Print checks from tape or disk input
- Print checks from keyboard input
- List checks on the screen before printing
- List checks on the screen after printing ... with check totals
- Make check corrections
- Printed statements for records
- Special typing fonts

16K and Printer Required

Cassette Tape: \$25.00 including postage & handling (make your own disk version)

APPLE VALLEY SOFTWARE CO.

P.O. Box 24274
Apple Valley, MN 55124

Minnesota residents add 6% sales tax.

Circle No. 105 on Reader Service Card

COMPLETE YOUR LIBRARY OF THE COLOR COMPUTER...



Add to your COLOR COMPUTER MAGAZINE collection today. Make your personal library complete and authoritative with any issues you may be missing.

Copies are available for issues published during the last twelve months—be sure to specify the issues you want. If a particular issue is out of stock, your payment will be refunded promptly.

Back issues of THE COLOR COMPUTER MAGAZINE are priced at \$6.00 each, postpaid. Outside USA, \$7.00 each.

THE COLOR COMPUTER MAGAZINE

CN 1914 Maristown, NJ 07960

Please send issues of THE COLOR COMPUTER MAGAZINE listed below:

Issue	Qty.	Unit Price	Total Price
Payment Enclosed			\$

Mr./Mrs./Ms. (print full name)

Address

City/State/Zip

Software Compatibility A Consideration

To run on the Color Computer, any software package will have to conform to a few conditions. First off, if it isn't obtained by communications circuits; it must come on a 5¼-inch disk. Traditionally, public domain software was distributed on 8-inch disks, so not all free software is available on the now-common 5¼-inch disks. (The official, standard CP/M medium remains the 8-inch disk.)

Disks must also be format-defined for the Radio Shack Model I, which is the same as the Omikron format. The CP/M Users Group in New York City sells a catalog of public domain software and will reproduce and mail almost 100 disks of software at a nominal cost. The formats that group produces are 8-inch IBM, North Star/Apple, Kaypro II, and Epson QX-10, not the Omikron format. Software for purchase from commercial sources is generally found in many different 5¼ formats and may include the single-density Omikron format.

Software must, of course, be able to run under CP/M 2.2. It also must fit in the 56K long Transient Program Area. If it depends on screen control functions, it must be able to use ADM-3A functions that have been emulated on the Color Computer.

Some software requires a minimum amount of disk storage space. On a 35-track drive the single-density Omikron format has a capacity of 80K. With space taken for directory information about 70K remains. Capacities of over 160K are common today, and many powerful software packages depend on such greater capacities.

This condition was perhaps the most serious limitation of the Coupler, since it originally came with single-density only. Now, however, it comes with double-density, which gives you 115K.

(Ed.'s note: Another Wayne product called Multiform, which was not reviewed, lets you read and write a dozen disk formats, including those made by Radio Shack, Xerox, Kaypro, Heath, Lobo, Osborne, Morrow, and Zenith.)

The acid test of compatibility is to see how commercial software works. If you're going to buy software, read a description of the expected environment, talk with a sales person, or negotiate a return policy in advance. I tried a Lifeboat Associates full screen editor and a combination word processing, spreadsheet, graphics,

and list processing program. They all worked fine.

My experiences with the Coupler were virtually trouble free. I did find some inconveniences in Wayne software that are potentially troublesome. One problem is that I couldn't use my printer at 9600 baud. This problem is not unique to Wayne Technology, however; I've had a similar problem with OS/9 but have been able to correct it with a patch. Timing loops that transmit bits to the serial port are critical at that speed and should be adjustable, but the Config utility does not allow any fine tuning to the timing controls. It only permits the specification of an index number to represent the baud. Some instruction on making patches to printer constants or loops would be a reasonable stop-gap solution.

There were also occasions when I preferred the 32-column by 16-row format to the Video80 format. During vertical scrolling you can read an entire line as it flashes by even though it may wrap around to the next line. I found Video80's dynamic horizontal scrolling disconcerting when it occurred during vertical scroll operations. The only way to change from Video80 to the default format is via a cold boot of CP/M with the Reset button.

My most serious reservation about this version of CP/M regards using it with only one drive. The Phantom drive feature allows disk-to-disk copies with a single drive but that demands patience, a commodity often in short supply. As a test, I used the Phantom drive to copy the system disk to another. Although a prompt was displayed each time a disk had to be swapped, there was no information about when to load the source or target disk. According to Wayne, if you choose the wrong disk you simply lose the transfer and get an error message. After more than 15 swaps, I just abandoned the test.

It's reasonable to seriously consider adding CP/M to your system. Compared with the cost of a new CP/M computer, the cost — and abilities — of the CoCo Coupler 1 are more than acceptable.

— Eugene Grunby

(Ed.'s last note: Color Power Unlimited's Color Power II is the CP/M unit competing with Wayne's. We would like to have reviewed them both but Color Power wasn't yet ready with its product. We will review it as soon as possible.)



SOFTWARE TO STIMULATE

Stimulate your mind every month with the #1 magazine of computer applications and software... CREATIVE COMPUTING! There is no other magazine like CREATIVE COMPUTING... WE TALK YOUR LANGUAGE! ... Any make... any model... whether it's Apple, IBM, Radio Shack, TI, Mattel, Atari, Commodore... CREATIVE COMPUTING has monthly departments and articles you can use! You will receive a continuing education on *everything* related to personal computing with intriguing and useful applications for your personal computer. This is a magazine that will help you get more out of your computer—versatility, function and enjoyment—in easy-to-read and fully illustrated articles!

Subscribe to CREATIVE COMPUTING today and save up to 26%!

YES

FREE
10th ANNIVERSARY
LCD QUARTZ CLOCK
WITH PAID
SUBSCRIPTION

creative computing

P.O. Box 5214, Boulder, Colorado 80322

Please enter my subscription to CREATIVE COMPUTING for:

☐ 8 issues

\$13.97.

I SAVE 16%!

☐ 12 issues

(One year) \$19.97.

I SAVE 20%!

☐ 24 issues

\$36.97.

I SAVE 26%!

Mr/Mrs/Ms _____

(please print name in full)

Company _____

CC8H278

Address _____

City _____

State _____

Zip _____

Check one: ☐ Payment enclosed ☐ Bill me later

Charge my: ☐ American Express ☐ Visa ☐ MasterCard

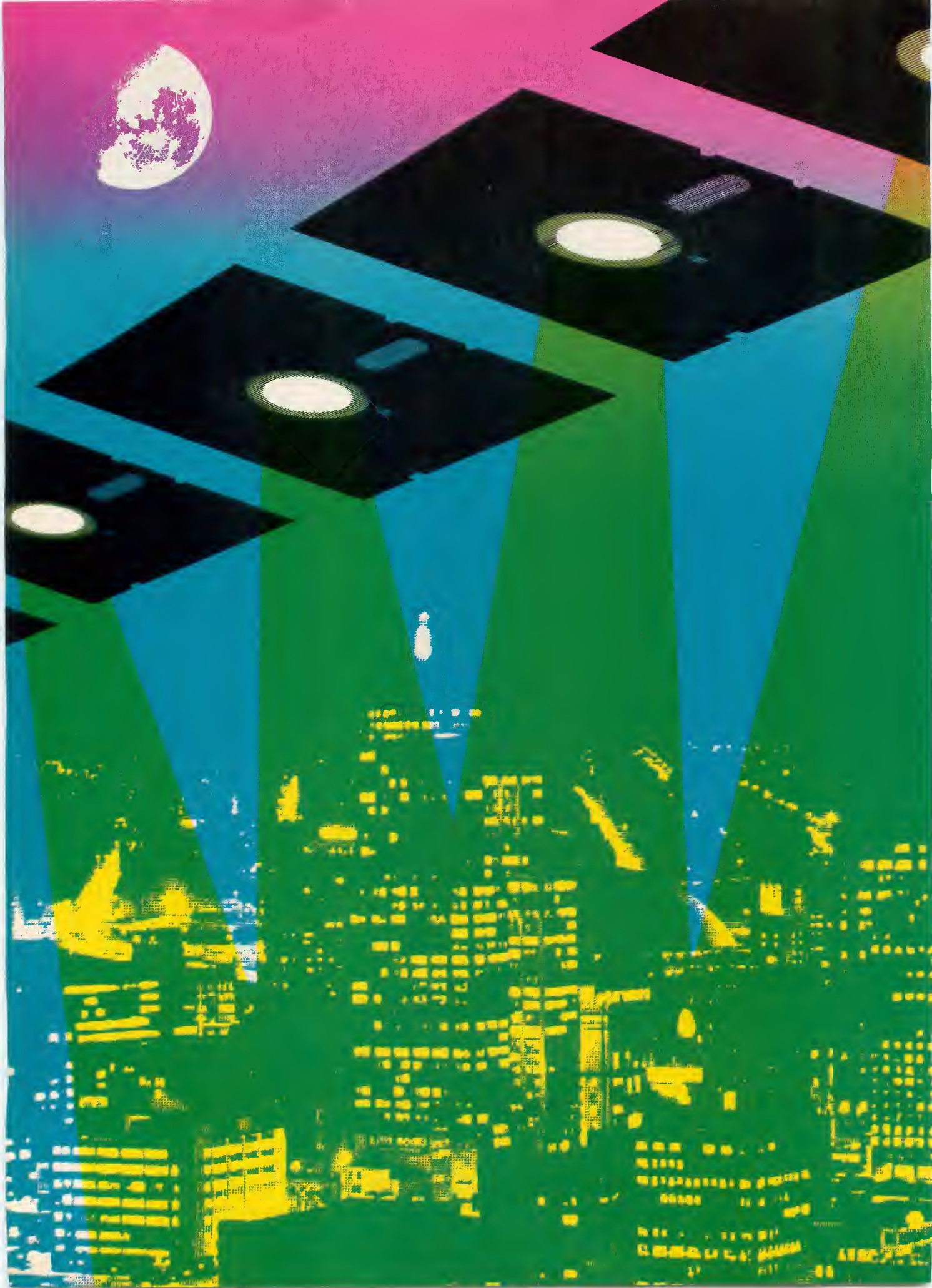
Card No. _____

Exp. Date _____

Savings based on full one-year subscription price of \$24.97.

Please add \$5 per year in Canada, \$10 per year in all foreign countries.

Please allow 30 to 60 days for delivery of first issue.



DISK ENCOUNTERS

Make your DOS a new experience.

Part One

by Doug Kelley

DECB2 IS DESIGNED TO ADD several new features which I thought would come in handy while programming with the Basic interpreter. As it turns out, the modifications are useful for the non-programmer as well.

Any Color Computer with 64K of memory and at least one disk drive with Disk Basic 1.0 can use this program. Once the program has been run, it uses no memory except for some in the upper 32K, the area Basic doesn't access. When the program is run, it copies Basic from ROM into RAM, without destroying any Basic program which may be in low memory. Next, ECB2 will rewrite some of the sections of the interpreter, and then return to Basic with a new sign-on message.

The first sections of code modified are the DSKI\$, DSK0\$, BACKUP, and DSKINI. After the program is finished, you will be able to read and write to track 35 on the disk using the DSKI\$ and DSK0\$ commands. BACKUP will copy all 36 tracks and DSKINI will format all 36. Two uses for the 36th track are: storing a back-up directory; and writing data there to help make a program uncopyable. Be sure to only write to the 36th track if the disk has been formatted for 36 tracks, otherwise an INPUT OUTPUT (not IO) Error message will appear.

Surprise!

No longer will you have to put up with ambiguous error messages as BS ERROR, and my favorite: NO ERROR. Instead you will be greeted with BAD SUBSCRIPT ERROR and NOT OPEN ERROR. Even the undocumented UNDEFINED FUNCTION ERROR has been included.

Next on the program's agenda is the enabling of an automatic key repeat function. If any key is pressed for more than half a second, it will repeat. For those of you who are interested, this function works from the computer's 60Hz interrupt, so some sound effects may be slightly distorted due to the longer delay every 1/60th of a second.

What's next? How about a *readable* display? It does modify the CHROUT routine in ROM to display green letters on a black background instead of the eye-fatiguing black on green. One drawback to this feature is that you no longer have inverse (black on green) video unless you use a Poke command to put the characters on the screen; to get a green screen, you will have to type CLS1. The advantage: with software, you don't have to void your warranty, or worry about blowing your SAM chip to get this option.

Finally, the computer makes some less-involved modifications. The Verify function is turned on automatically so

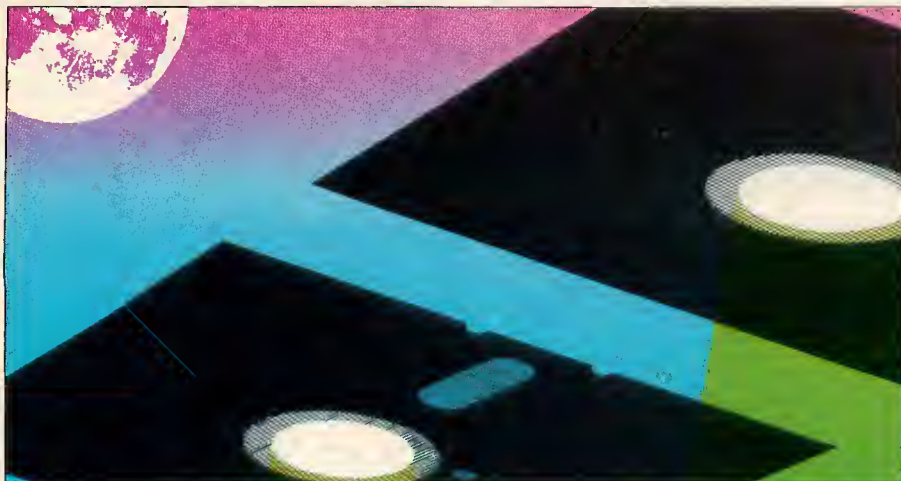
you don't have to do this manually. The disk drive is allowed to run longer after it has been accessed to allow the user more time to type in his next disk access command, reducing the number of disk motor starts and stops. Finally, the drive will only re-try one time after it gets an error, instead of grinding the head up and down the disk four times for any type of input/output error.

The Listings

I have provided two listings of ECB2. One is in Basic, the other in assembly language. Type in the Basic program, save it to disk, then Run it. I encourage those of you who know assembly language to type in the source code, and make any modifications you want as long as the first two lines remain the way they are. You will find the program fully commented and very easy to modify, *provided* you have a basic understanding of how the interpreter works.

I hope this program will be enjoyable and educational. I wish I could have made a 16K and 32K version, but most of the program has to modify the Basic interpreter directly in some way, and therefore, without 64K, the program would be almost impossible. ■ ■ ■

♦ Programs



TWO BUGS IN DISK Basic ROM 1.0 were not corrected in version 1.1. Let's fix them ourselves. I will describe the bugs, then give the source code for some corrections to Disk Basic 1.0 ROM that will also add some extra, useful features to your ROM.

Turning on your machine, or on cold start (POKE 113,0 Enter, then Reset) the Verify function is normally set to off. This can be a real nuisance, if you use the verify function all the time. Also, my printer is set to receive data into its buffer at 9600 baud, but Basic defaults to 600 baud. Remembering to set the baud for my printer system each time I use a different program, or to include a POKE 150,1 command (needed to set the baud to 9600) in everything I write, is not efficient.

Did you know that for years Model III owners have had the pleasure of turning their computer on, putting a disk in drive 0, and simply hitting Reset to have a program of their choice automatically loaded and executed? This is referred to as *booting* a system. It's a real convenience to frequent disk users. I thought that feature (an easily user-configurable boot routine) would be really nice to have on my Color Computer.

I have been using a Color Computer that can be configured to boot virtually any program on a disk using a one- or two-line Basic program. This boot is accomplished by holding down the space bar while Reset is pressed. To do this and make the other changes we mentioned, a few alterations need to be made to Disk Basic ROM. Since the ROM itself is inalterable, I dump the ROM to low RAM, alter the code there, then burn an EPROM with the altered code and substitute that EPROM for the original Disk Basic 1.0 ROM in the disk controller card. What is

surprising is that all the improvements are made using a 60 line assembly language program.

The "Head Banger Bug" is encountered every time you access your disk after turning your machine on or a cold start. You can detect it as that annoying "brrrrrap, brrrrrap" noise your drive makes before it finds the file or directory for the first time. The head of your disk drive is being banged repeatedly against the *inner stop* of the drive. (The inner stop prevents the head from moving off the disk and onto the center hub.) It is the result of sloppy coding, and is at the least annoying, and may actually shorten the life of your drives.

It happens because the Disk Basic software thinks your head is sitting at track zero. Unfortunately, this is seldom true. In fact, your head is wherever it was when you turned the system off... usually sitting poised over track 17. When the drive tries to find the directory track after a cold start, it goes careening inward, and only recovers its mistake after slamming itself against the inner stop. Microsoft has not corrected this flaw in its new release of Disk Basic 1.1. I hereby put the code to correct this in the public domain, and earnestly hope Tandy and Microsoft will make the needed correction in Disk Basic 1.2 if and when they write a second revision to the Disk Basic ROM.

The Head Banger bug is fixed in my patches to disk ROM by altering the initialization routine of the disk ROM so that on a cold start or a newly turned on machine, flags are set for each of four drives. When a drive is later accessed those flags are checked; if they show that the drive had not been previously accessed, the head is first reset to track zero before any other disk operation is performed. That same initialization routine

patch has added to it some code to reset the baud to your taste, and to turn the Verify function on.

The "Head Settle Bug" is an extraordinarily subtle bug that affects only owners of two-drive systems using solenoid equipped non-Tandy drives (for example, MPI's, Shugart's, Teac's, and Pertec's drives all have solenoids... TEC's, TPI's, and Tandon's do not). It manifests itself as the very infrequent destruction of a sector on a disk during the course of two-drive disk operations. It is caused by the failure of Microsoft's disk software to wait for the head of a drive to be lowered onto the disk by its solenoid, but is only a problem when a Write function is performed on one disk immediately following a Read or Write operation to another disk drive. Even in that case, the problem will arise only very occasionally, as in most cases the time it takes for the head to find its new position on the drive gives it time to settle. Only when you switch from one drive to write to another *and* the area you are trying to write to is just exactly where the head of that drive happens to be will a disk crash result.

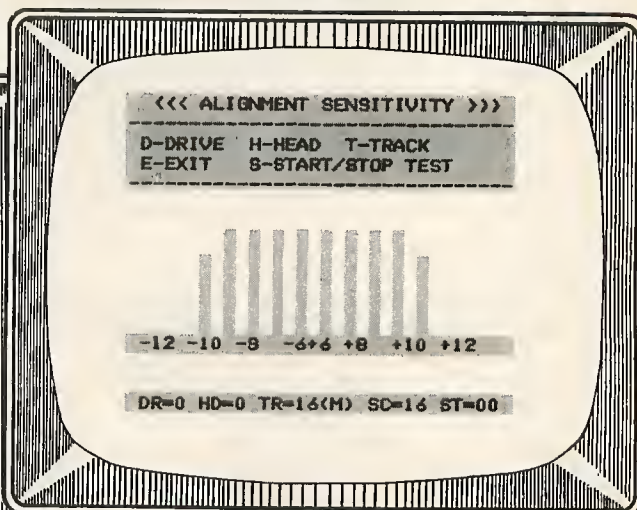
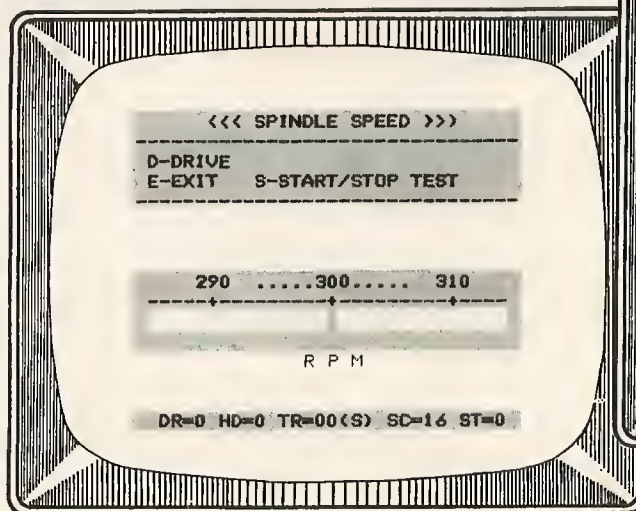
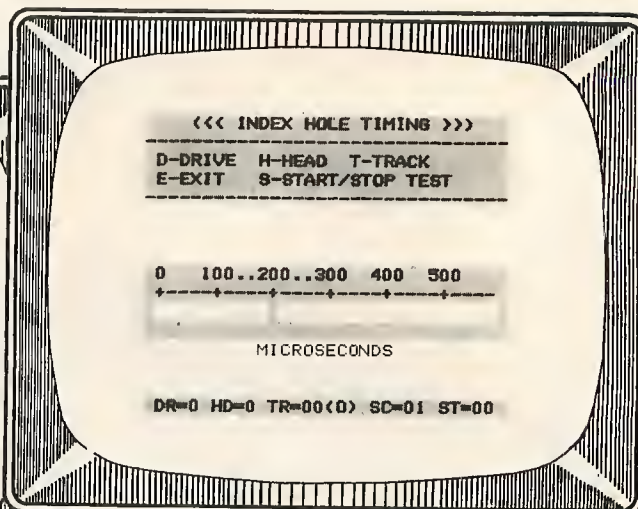
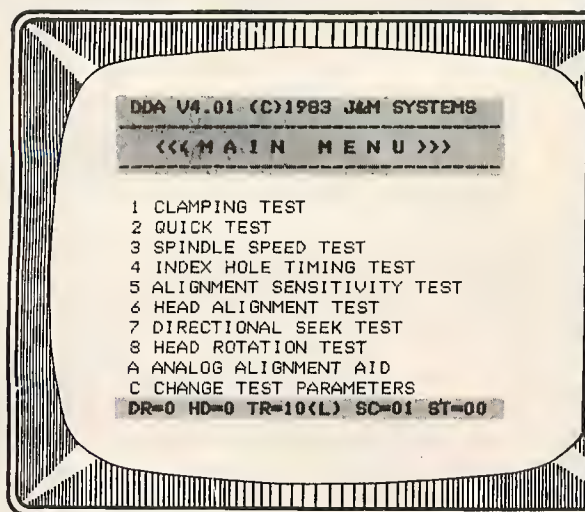
The Head Settle bug can be fixed by merely disabling the solenoids on solenoid operated drives. This is done by removing the HS (head select) jumper on the drive and jumpering the HM or the HL jumper (some drives call it "head load" and others call it "head motor"). But if you wish to use your solenoids, this patch to the ROM will let your drives be properly accessed. If you don't have solenoid equipped drives, this patch will not significantly affect the operation of your system. (At worst it will make some long two-drive copy procedures a few seconds slower over the course of many minutes of use).

The fix consists of a check to see if a switch has been made from one drive to another and, if so, the computer is forced to wait 80 ms before proceeding. Only a 30 ms or shorter wait is specified by most manufacturers of solenoid-equipped drives, but the 80 ms routine is conveniently already present in Basic. The extra 50 ms delay will not be noticeable in normal use.

The boot routine is started when the computer checks to see if the space bar is held down during the initialization sequence. If it is, Basic is fooled into thinking you just entered RUN "BOOT". The really nice thing about this way of booting the system (as opposed to the clumsy code Microsoft wrote into the disk 1.1 ROM as the DOS command) is that you,

Disk Drive Analyzer

A unique approach to
Data Reliability.



In 30 seconds this program will make
the following tests while drives are in
your computer.

- Head Alignment
- Motor Speed
- Index Hole Timing
- Azimuth
- Hysteresis

This program may be used to help align
your drives without costly test equipment.

To Order, Call: (505) 265-1501



137 Utah NE • Albuquerque, New Mexico 87108 • (505) 265-8072 • (505) 265-1501

This program is a must for:

- **Dealers**—Check drives as they are received. Save time and money on service contracts by quickly isolating drive problems.
- **End Users**—Check drive performance without costly service calls. Isolate faulty or misaligned drives. Monitor long term drift.

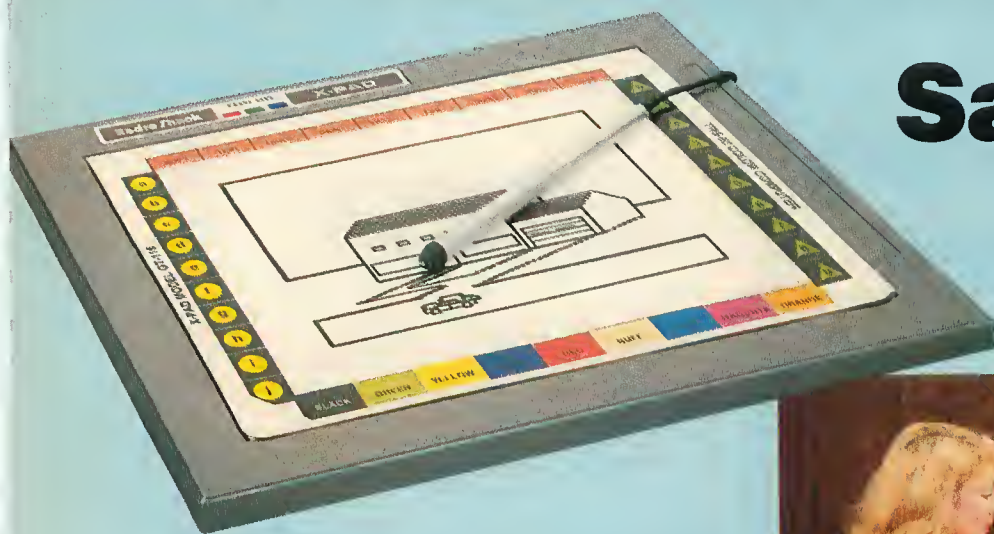
\$79—Single Sided

\$99—Double Sided

Terms, COD Cash or Cashier's Check, Visa,
MasterCard. Add \$3.00 for shipping in continental
United States.

Circle No. 100 on Reader Service Card

TRS-80 COLOR COMPUTER



Save \$250

Reg. 349.95
99⁹⁵



**Get This TRS-80
Graphics Input Tablet
at Our Lowest Price Ever!**



- Get Instant Graphics at the Touch of a Pen
- Easily Transfers Your Own Drawn or Traced Designs into Your Color Computer
- Ideal for Medical, Architectural, Educational, Business and Other Graphics Applications
- Tablet Surface is Scaled to be Directly Compatible with Display Screen Size
- Compatible with Machine Language Routines for High-Speed Drawing
- Hurry—Sale Ends July 23, 1984

GT-116 "X-Pad". A multi-purpose input device that's a breeze to use! It's easily accessed by Extended BASIC graphics commands, and includes software that simplifies data input. An interactive menu for all drawing routines plus user-defined menu functions minimize keyboarding. You can even print your screen designs on bit-image printers. Comes with a pen equipped with a pressurized, leakproof standard ink cartridge that is easily changed with a stylus for tracing. Tablet contains all necessary electronics. Plugs into Program Pak™ slot (Color Computer 2 requires Multi-Pak Interface). 26-1196

Save Even More With Our X-Pad "Package Deal"

Save 299⁹⁵

Reg. Separate
Items 529.90

229⁹⁵

AS LOW AS
**\$25 PER
MONTH**

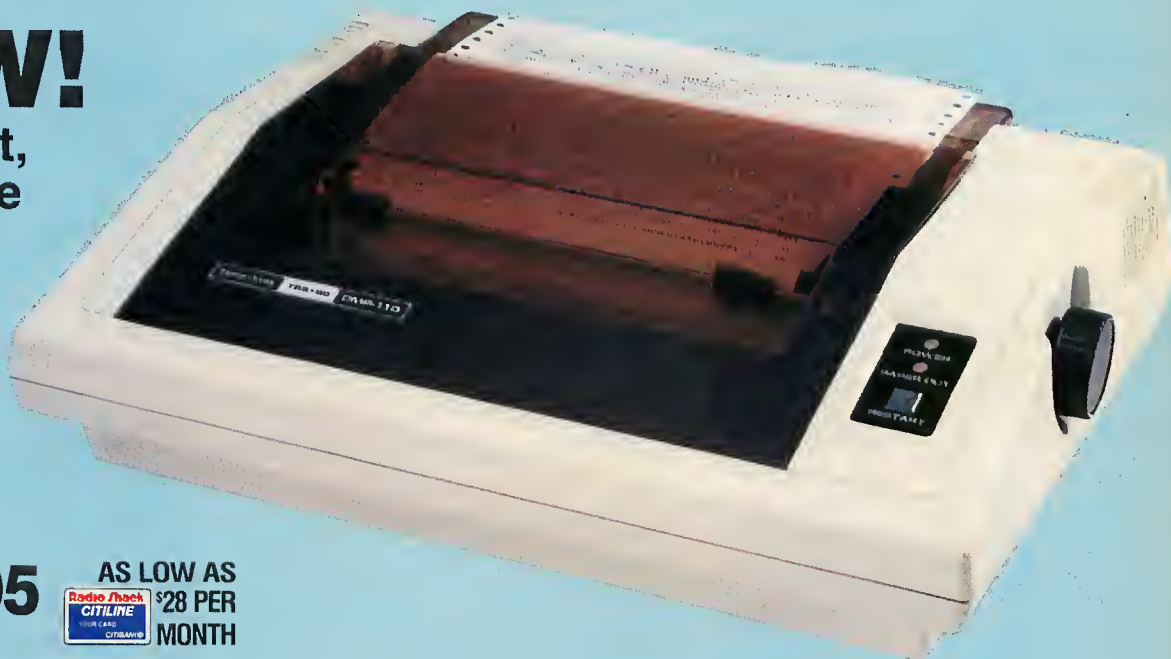


We've combined the GT-116 X-Pad with our Multi-Pak Interface for the ultimate in convenience and value! Easily switch from Program Paks to the X-Pad and other peripherals—just move the Interface's selector switch, or change between the four slots under program control. Add a disk drive, and you can save and load screen images created with the X-Pad to and from disk for quick and easy access. Sale ends July 23, 1984. U.L. listed. 26-1196/26-3024

GRAPHICS EXTRAVAGANZA!

NEW!

Low-Cost,
9½" Wide
Printer



399⁹⁵

AS LOW AS
Radio Shack
CITILINE
YOUR CARD
CITISAVE
\$28 PER
MONTH

- An Ideal Dot-Matrix Printer for Home or for the Small-Business on a Budget
- "Triple-Mode" Punch—Hi-Res Graphics, Correspondence and Data Processing
- Includes New Cursive and Microfont Styles
- All Type Fonts Can Be Elongated
- Prints 50 Characters Per Second in the Data Processing Mode
- Features Color Computer Compatible Serial and Parallel Interfaces

DMP-110. High-performance printing has never been this affordable! Bit-image graphics mode is perfect for use with the TRS-80 X-Pad, and is compatible with Color Computer screen print routines (26-312, \$9.95). The high-resolution mode features 960 dot-addressable, 16-dot columns for detailed pictures and charts. Print impressive-looking reports with proportionally-spaced or correspondence-quality characters at up to 25 cps. Use super, subscripts and underlines. Prints standard, elite or condensed characters for easy-to-read program listings. Use single sheets or fanfold paper. 26-1271



Seven-Color Ink-Jet Printer

CGP-220. A super quiet, drop-on-demand graphics/text printer! Screen print utility (26-312) provides spectacular Color Computer displays. Prints 2600 dots/second in graphics mode with a resolution of 560 dots/line in one color and 640 dots/line in multi-color mode. 26-1268

Send me a free
TRS-80 catalog.

Mail to: Radio Shack
Dept. 85-A-015
300 One Tandy Center
Fort Worth, Texas 76102

NAME _____
ADDRESS _____
CITY _____
STATE _____ ZIP _____
TELEPHONE _____

Radio Shack®
The Technology Store™

A DIVISION OF TANDY CORPORATION

Prices apply at participating Radio Shack stores and dealers.

Circle No. 50 on Reader Service Card

the user, can configure the system to load and run any program you want with just a simple one- or two-line Basic program.

For example, if you want to make your Telewriter 64 disk boot, rename the program U/BAS to BOOT/BAS. That's all there is to it! Now, instead of entering RUN "U" you can merely insert your Telewriter disk in the drive and hit the Reset button while holding down the space bar. Should you happen to bring that disk to someone else's house and want to run it on their conventional disk ROM, you merely enter RUN "BOOT" and it will function normally. Thus, complete compatibility with non-booting systems is achieved.

To boot machine code files, you must type in a Basic loader program: 10 LOADM "filename/ext": POKE &HFF40,0:EXEC. The POKE will turn off the disk drive motor after loading the file and before executing it. Occasionally you will have to add to this simple routine a PCLEAR statement to get the Basic loader program out of the way of the machine code program you are loading. I leave this as an exercise for the reader: just remember that in default (PCLEAR 4) mode, Basic programs reside from \$2600 in memory on up. A machine code program that loads over that area will clobber your Basic loader. You've got to move the Basic program out of the way (either up or down in memory) using the PCLEAR statement. You must also take into account the PCLEAR bug (if you have a version 1.0 Extended Basic ROM), that forces you to put your PCLEAR statement at the end of your Basic program, and then jump to it at the start of the Basic program.

The Source Code

To use the program, first assemble it into a segmented binary object file. The constant "LORAM," set at the start of the program, is used to position the code to the block in low RAM you are going to move the original Disk Basic data to, prior to patching it and then burning an EPROM. Thus, as I moved the Disk Basic data to \$2000 through \$3FFF (this is the buffer area for the Intronic EPROM programmer), I set LORAM to \$2000. I also set the baud to 2400 by putting decimal 18 into location \$380B. You can cause your system to boot in any baud you like by substituting the requisite constant (1 for 9600 baud, 87 for 600 baud, etc.) in the assembly listing.

The source code was created on the Microworks Macro 80C Editor/Assembler, and uses one directive instruction with which users of other editor/assembler programs may be unfamiliar: the

REORG statement. This instruction tells Macro 80C's assembler to go back to the address sequence it was using just prior to the last ORG statement it acted on, increment it by one, and continue assembly at that address. In other words, it causes assembly to continue where it left off when the previous ORG statement nullified the ORG statement before it (resulting in a "nested ORG," sort of). A careful look at the addresses in the second column of the assembly listing will help you understand this instruction. (I certainly don't blame you if you find my verbal description a bit confusing... the function of that darn instruction is very hard to put in words!)

"Complete compatibility with non-booting systems is achieved."

The binary file you get is highly segmented, as it has to load in throughout Disk Basic ROM to insert its patches. After assembling the patches file I saved Disk Basic to disk (SAVE "DBASIC", &HC000, &H0FFF, &HA027) then offset load Disk Basic to low RAM (LOADM "DBASIC", &H6000). I then superimposed the patches by loading my binary patch file from the disk (LOADM "PATCH/BIN") and saved the freshly created modified Disk Basic file to tape (CSAVE "NEWDISK", &H2000, &H3FFF, &HA027). Next I turned the power off, removed my disk controller card, inserted an EPROM programmer into the Color Computer's system port, and turned the machine on. I then input the tape I had just made and burned a 68764 EPROM (this variety is pin-for-pin compatible with the ROM in the disk controller) with the data I had loaded into \$2000 through \$3FFF. That was that! One corrected disk EPROM cooked up to my specifications! All that remained was to open up my disk controller card, remove the disk ROM, and replace it with the EPROM I had just burned.

Cautions

The new EPROM will be 99 and 44/100ths percent compatible with existing disk software. In one month of extensive testing I have encountered only one program that would crash because of the patches. This was a program that, on execution, went into all RAM mode and proceeded to boot itself up to high RAM starting at location \$D800. This overwrote the patches and caused the system to crash when the program (a disk directory utility) accessed the disk. This program would also be incompatible with the new Disk Basic 1.1

ROM (which, like my patched ROM, extends above \$D800 for about 80 bytes). Fortunately, in this instance, the author (Jeff Francis, a rising star in the world of Color Computer assembly language programming) kindly supplied me with his source code on disk, and I was able to quickly modify and reassemble a version of his utility to get it out of the way of the patches. (This is one strong argument for insisting that authors supply their source code with all utilities they sell... something very seldom done, but very useful in a pinch.)

I should note here a very recent discovery I made in the course of experimenting with other sorts of patches to other ROMs. If you wish to substitute patched EPROMs for the Disk Basic and/or the Extended Basic ROM, you need not use EPROMs that are faster than 450 ns cycle time. However, if you are working with a disk system, you would be very wise to use 250 ns cycle time EPROMs as your substitute for the Basic ROM. If you fail to heed this warning, you may wind up with a computer that appears to be working fine until you access your disk, at which point it produces blobs of black on the screen, and then crashes. I've observed this on three out of six Color Computers. The only kind of 8K by 8 EPROM that is rated at 250 ns is the 28 pin 2764. (Microprocessors Unlimited of Beggs, OK sells such a chip for under \$6 each.) To use it you will have to make an adapter that rewires about six of its pins. Careful study of the 2764's pin-out and that of the Color Computer's ROM socket will quickly reveal to the knowledgeable hardware hacker just how to wire such a socket. I have found that a 28-pin wire wrap socket and a 24-pin header make the perfect raw materials for constructing such an adapter socket.

There is one other warning I must give you relating to the copyright of the Microsoft Disk Basic ROM. When you bought your disk controller, you also bought rights to use Microsoft's Disk Basic 1.0. It is my understanding that you have the right to modify that code as you choose, *provided* you use only one modified EPROM at a time in your disk controller. You can crank out all the different EPROM versions of Disk Basic you want, but may use them only on your own computer and may use only one at a time. All other variants and the original itself must be sitting in conductive foam... *not* in another disk controller pack of yours or anyone else's. To do otherwise would be to pirate Tandy's and Microsoft's program... a morally reprehensible action and violation of federal copyright law as well!

■ ■ ■

♦ Program



The Joystick that sets you free!

The one-hand operation of this fantastic new joystick will truly set you free and increase the pleasure of playing your favorite video games. The smoothness and responsiveness of this unique joystick that operates completely

without a base is something to be experienced. Available direct from us or from your independent computer retail store. (See below)

\$49.95 suggested retail

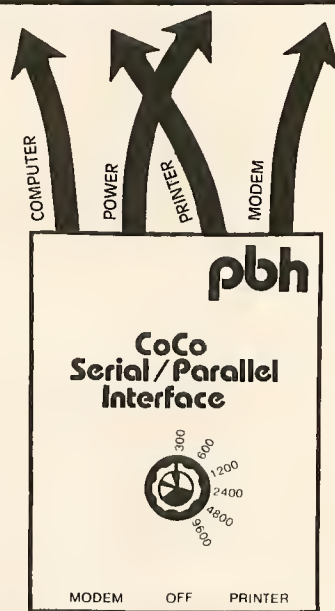
STOP changing Printer and Modem Cables! Our **Parallel Printer Interface** provides **Switch Selectable Printer** or **Modem** operations for both CoCo and MC10. It features switchable baud rates from 300 to 9600. It comes complete with power supply, modem cable and "Centronics" type printer cable. For Basic 1.1 and later revisions.

Available direct from us or from your independent computer retail store. (See below)

Only \$89.95 suggested retail

pbh Computer Products, Inc. P. O. Drawer 55868
Houston, Texas 77055
713/956-0207

When ordering direct from **PBH** please enclose \$3.00 per item for shipping.



Stocking Distributors

Compukit
Houston, TX. 77059

Spectrum Projects
Woodhaven, N.Y. 11421

Authorized Dealers

Endicott Computer
Software & Accessories
Huntsville, AL. 35801
The Computer Store
Jasper, IN. 47456
The Software Connection
Ft. Lauderdale, FL. 33319
Colorware, Inc.
Woodhaven, N.Y. 11421

TRS TECH
Computer Services
Houston, TX. 77033
Computers & More
Huntsville, TX. 77340
The Photo Shop Radio Shack
Wilmar, MN. 56201
Patterson Electronics
Mountain View, AR. 72560

Computers, Etc.
Austin, TX. 78745
Cinsoft
Cincinnati, OH. 45237
EDC Industries
Los Angeles, CA. 90042
Sound Center Radio Shack
Whiterock, N.M. 87644
& Los Alamos, N.M. 87544

Chips, Incorporated
Atlanta, GA. 30340
Computer Associates
West Fargo, N.Dak. 58078
Computer Plus, Inc.
Littleton, MA. 01460
Turtle Micro Ware
East Lime, CT. 06333

202,752 BYTES

Monitor Package

\$144.⁴⁴

123 Monitor
VC-1 or VC-2 Video Controller
TS-1 or TS-2
Howard TV Stand

EXTRA*

\$24.00

MORE

Drive 0 Package

\$424.⁰⁰

DD-2 DSDD Drive
DC-1 40 Track Controller
CA-1 Cable

CONTROLLERS

DC-1 ROM disk controller reads & writes to 35 and 40 track single and double sided drives with all models of the color computer (J&M)
\$134

VC-1 Video interface mounts inside color computer by piggybacking IC on top of interface—no soldering and no trace cuts
\$24.45

VC-2 for color computer 2 — monochrome only
\$26.45

VC-3 for color computer 2 — color and monochrome
\$39.45

*The Howard drive 0 package gives 359,424 bytes of available storage for \$444.39 using our double sided, double density disk and 40 track controller. The regular 35 track drive 0 gives 156,672 bytes for \$399.95. The Howard package gives an extra 202,752 bytes for \$44.44 more.

COMMUNICATE

CC-1 Use your modem & printer at the same time. Communications ROM pack includes a cable for serial which leaves the serial part on back of the color computer free for a modem.
\$9.95

MD-1 Auto Answer Auto Dial
\$196 Direct connect modem with LED status lights (US Robotics).

PRINTER

RX-80 Epson printer needs parallel interface below
\$299
RX-100 parallel interface below
\$585
Botek Serial to parallel interface comes with all necessary cables.
\$68.45

Any product may be returned within 30 days for refund if not satisfied.

We handle all warranty & repair work thru our direct contact with the manufacturer.

Shipping - \$2 for controllers; \$5 for disks; \$7 for printers, monitors & 'packages'; \$2.75 for stands.
Canadian orders slightly higher.

MONITORS

122 Zenith 12" Amber gives excellent resolution and is easy on the eyes
\$134

123 New Zenith green screen for serious programmers and word processing
\$114

131 13" Color monitor with speaker, composite, and RGB jack (Zenith)
\$334

All Monitors need video controller

DISKS

DD-1 ½ height 5¼" 40 Track SSDD 179,712 bytes available
\$269

DD-2 ½ height 5¼" 40 Track DSDD 359,424 bytes available
\$319

DD-3 Dual 3" 40 Track SSDD 359,424 bytes available (Amdek)
\$449

CA-1 Cable to connect disk to controller
\$24.44

Drive 0 needs controller DC-1 above

TV STANDS

COCO 2

TS-1 15W x 11D x 4H for 13" screen
\$29.50 **TS-2** **\$29.50**

TS-4 24W x 11D x 4H for 19" screen
\$39.50 **TS-3** **\$39.50**

P5-1 18W x 15D x 2½H for all popular printers add \$5 for bottom feed slot
\$19.95

TV stands come with ROM pack cut-out. Specify ivory or smoked grey.

please send me the following

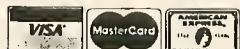
Name _____
Address _____
City, State Zip _____
Cat. # Description Cost

Include card # or check. Shipping _____
Ill. residents add 8% tax _____

Total _____

Howard Medical

Box 2, Chicago, 60690
312 944-2444



Circle No. 151 on Reader Service Card

10C5	E178	01470	FDB	NEW3+OFFSET	118D	00	02020	FCB	0	'REDEFINED ARRAY' ;?DD
10C7	E184	01480	FDB	NEW4+OFFSET	118E	524544454649	02030	PCC	0	
10C9	E19A	01490	FDB	NEW5+OFFSET		454544204152				
10CB	E1A3	01500	FDB	NEW6+OFFSET		524159				
10CD	E1B1	01510	FDB	NEW7+OFFSET	119D	00	02040	FCB	0	
10CE	E1C0	01520	FDB	NEW8+OFFSET	119E	444956495349	02050	PCC	0	'DIVISION BY ZERO' ;?/0
10CF	E1CE	01530	FDB	NEW9+OFFSET		4F4E20425920				
10D1	E1D3	01540	FDB	NEW10+OFFSET		5A45524F				
10D3	E1DE	01550	FDB	NEW11+OFFSET	11AE	00	02060	FCB	0	
10D5	E1EF	01560	FDB	NEW12+OFFSET						
10D7	E1FE	01570	FDB	NEW13+OFFSET	11AF	494C4C454741	02070	PCC	0	'ILLEGAL DIRECT' ;?ID
10D9	E20C	01580	FDB	NEW14+OFFSET		4C2044495245				
10DB	E220	01590	FDB	NEW15+OFFSET		4354				
10DD	E230	01600	FDB	NEW16+OFFSET	11BD	00	02080	FCB	0	
10DF	E243	01610	FDB	NEW17+OFFSET	11BE	54595045204D	02090	PCC	0	'TYPE MISMATCH' ;?TM
10E1	E252	01620	FDB	NEW18+OFFSET		49534D415443				
10E3	E26D	01630	FDB	NEW19+OFFSET		48				
10E5	E281	01640	FDB	NEW20+OFFSET	11CB	00	02100	FCB	0	
10E7	E28E	01650	FDB	NEW21+OFFSET	11CC	4F5554204F46	02110	PCC	0	'OUT OF STRING SPACE' ;?OS
10E9	E29C	01660	FDB	NEW22+OFFSET		205354524948				
10EB	E2A5	01670	FDB	NEW23+OFFSET		472053504143				
10ED	E2B4	01680	FDB	NEW24+OFFSET		45				
10EF	E2C5	01690	FDB	NEW25+OFFSET	11DF	00	02120	FCB	0	
10F1	E2D8	01700	FDB	NEW26+OFFSET	11E0	535452494E47	02130	PCC	0	'STRING TOO LONG' ;?LS
10F3	E2E9	01710	FDB	NEW27+OFFSET		20544F4F204C				
10F5	E2F4	01720	FDB	NEW28+OFFSET		4F4E47				
10F7	E2FE	01730	FDB	NEW29+OFFSET	11EF	00	02140	FCB	0	
10F9	E312	01740	FDB	NEW30+OFFSET	11F0	535452494E47	02150	PCC	0	'STRING TOO COMPLEX' ;?ST
10FB	E320	01750	FDB	NEW31+OFFSET		20544F4F2043				
10FD	E32E	01760	FDB	NEW32+OFFSET		4F4D504C4558				
10FF	E341	01770	FDB	NEW33+OFFSET	1202	00	02160	FCB	0	
1101	E350	01780	FDB	NEW34+OFFSET	1203	43414E275420	02170	PCC	0	'CAN'T CONTINUE' ;?CN
1103	E35F	01790	FDB	NEW35+OFFSET		434F4E54494E				
1105	E378	01800	FDB	NEW36+OFFSET		5545				
1107	E37F	01810	FDB	NEW37+OFFSET						
1109		01820	FDB		1211	00	02180	FCB	0	
		01830	FDB		1212	424144204649	02190	PCC	0	'BAD FILE DATA' ;?PD
		01840	FDB			4C4520444154				
110B	4E4558542057	01850	NEW0	PCC	121F	00	02200	FCB	0	
	454484F5554				1220	414C52454144	02210	PCC	0	'ALREADY OPEN' ;?AD
	20464F52					59204F50454E				
111B	00	01860	FCB	0	122C	00	02220	FCB	0	
111C	535948544158	01870	NEW1	PCC	122D	444556494345	02230	PCC	0	'DEVICE/DRIVE NUMBER' ;
1122	00	01880	FCB	0		2F4452495645				
1123	52455455324E	01890	NEW2	PCC		204E554D4245				
	20574954484F				1240	00	02240	FCB	0	
	555420474F53				1241	494E5055542F	02250	PCC	0	'INPUT/OUTPUT' ;?IO
	5542					4F5554505554				
1137	00	01900	FCB	0	124D	00	02260	FCB	0	
1138	4F5554204F46	01910	NEW3	PCC	124E	424144204649	02270	PCC	0	'BAD FILE MODE' ;?PM
	2044415441					4C45204D4F44				
1143	00	01920	FCB	0		45				
1144	494C4C454741	01930	NEW4	PCC	125B	00	02280	FCB	0	
	4C2046554E43				125C	484P54204F50	02290	PCC	0	'NOT OPEN' ;?NO
	54494F4E2043					454E				
	414C4C				1264	00	02300	FCB	0	
1159	00	01940	FCB	0	1265	494E50555420	02310	PCC	0	'INPUT PAST END' ;?IE
115A	4F564552464C	01950	NEW5	PCC		504153542045				
	4F57					4E44				
1162	00	01960	FCB	0	1273	00	02320	FCB	0	
1163	4F5554204F46	01970	NEW6	PCC	1274	444952454354	02330	PCC	0	'DIRECT STATEMENT' ;?DS
	204D454D4F52					205354415445				
	59					4D454F54				
1170	00	01980	FCB	0	1284	00	02340	FCB	0	
1171	554E44454649	01990	NEW7	PCC	1285	554E44454649	02350	PCC	0	'UNDEFINED FUNCTION' ;?UF
	4E4544204C49					4F4544204655				
	4E45					4E4354494F4E				
117F	00	02000	FCB	0	1297	00	02360	FCB	0	
1180	424144205355	02010	NEW8	PCC	1298	484F4E455849	02370	PCC	0	'NONEXISTENT FILE' ;?NE
	425343524950					5354454E5420				
	54					46494C45				

* NEW ERROR MESSAGES

'NEXT WITHOUT FOR' ;?NF

(Note:-- all FCC output compressed -Ed.)

'SYNTAX' ;?SN

'RETURN WITHOUT GOSUB' ;?RG

'OUT OF DATA' ;?OD

'ILLEGAL FUNCTION CALL' ;?FC

'OVERFLOW' ;?OV

'OUT OF MEMORY' ;?OM

'UNDEFINED LINE' ;?UL

'BAD SUBSCRIPT' ;?BS

Sleuthing for Solutions?

PROBLEM: Disappointed with only a 32 x 16 screen and only upper case characters for your OS-9 operating system?

SOLUTION: O-Pak will give you a 52 x 24 HiRes screen with upper and lower case, character set editor, and utilities to copy from RS format to FLEX or OS-9 formats, all for only **\$34.95**

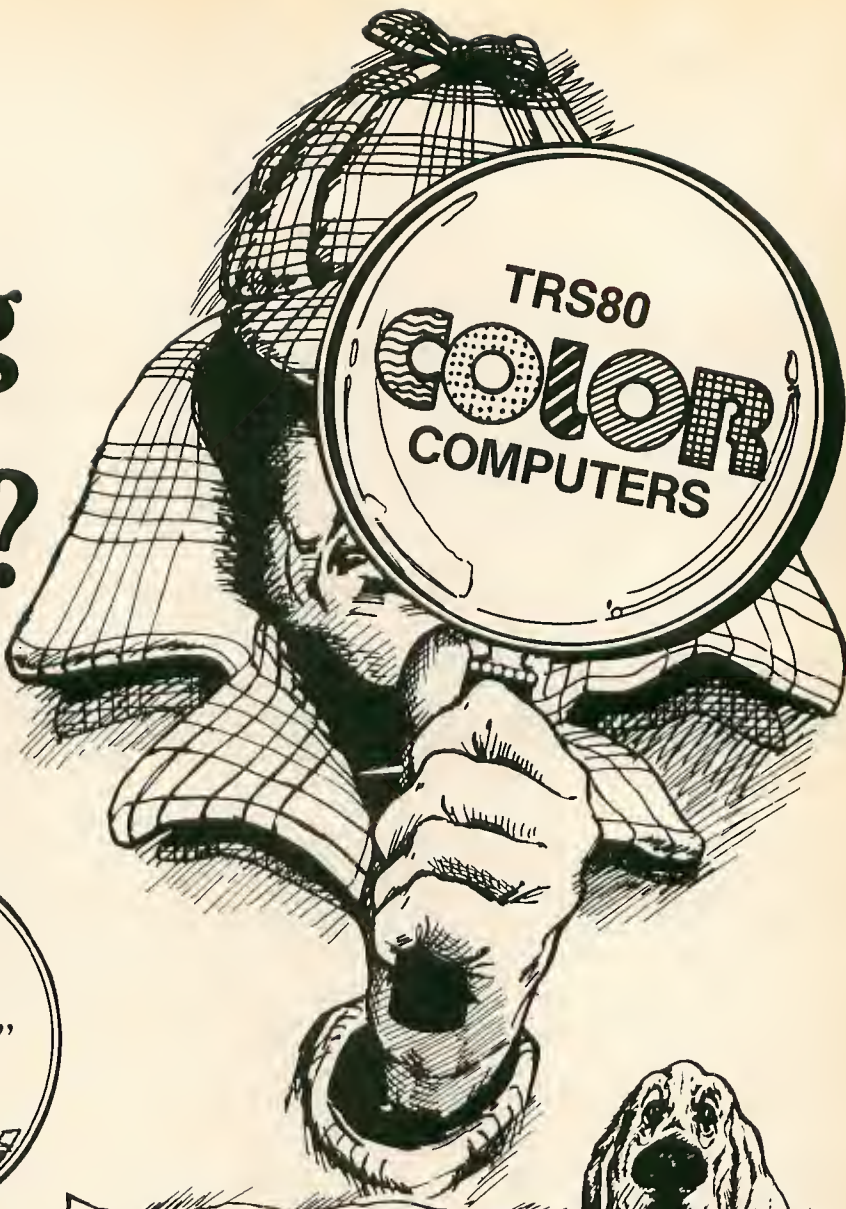
FREE!
Subscribe to
"SOFTNEWS"
a new 48 page
news letter.
Write or call
today!

PROBLEM: Less than thrilled with the editor/assembler included with your DOS?

SOLUTION: ED/ASM, a screen type editor and macro assembler will give you all you need for serious program writing for only **\$69.95**

PROBLEM: Need an easy to use and understand operating system that makes full use of the 64K in your Color Computer?

SOLUTION: FHL Color FLEX powerful, easy to use. More low cost software available for it than any other operating system for the Color Computer. Complete with Hi-Res for Only **\$69.95**



HELP! I am being held prisoner by equipment limitations! Send me....

- ☐ FHL O PAK \$34⁹⁵ ☐ FHL ED/ASM \$69⁹⁵
☐ FHL FLEX \$69⁹⁵
☐ FHL's SOFTNEWS FREE!

Name _____

Address _____

_____ Zip _____

INCLUDE \$3.50 SHIPPING AND HANDLING

HURRY!

FHL FRANK HOGG LABORATORY
 THE REGENCY TOWER • SUITE 215 • 770 JAMES ST. • SYRACUSE, NY 13203
 PHONE (315) 474-7858 • TELEX 646740


```

12A8      00      02380      FCC      0      'BAD RECORD' ;?BR
12A9      424144205245      02390 NEW27      FCC      0
12B3      00      02400      FCC      0
12B4      4449534B2046      02410 NEW28      FCC      0
12BD      00      02420      FCC      0
12BE      4F5554204F46      02430 NEW29      FCC      0
          204255464645
          522053504143
          45
12D1      00      02440      FCC      0
12D2      575249544520      02450 NEW30      FCC      0
          50524F544543
          54
12DF      00      02460      FCC      0
12E0      424144204649      02470 NEW31      FCC      0
          4C452048414D
          45
12ED      00      02480      FCC      0
12EE      424144204649      02490 NEW32      FCC      0
          4C4520535452
          53434555245
1300      00      02500      FCC      0
1301      414C52484144      02510 NEW33      FCC      0
          592045584953
          5453
130F      00      02520      FCC      0
1310      4649454C4420      02530 NEW34      FCC      0
          4F564552464C
          4F57
131E      00      02540      FCC      0
131F      53455420544F      02550 NEW35      FCC      0
          204B4F484649
          454C44454420
          535452494B47
1337      00      02560      FCC      0
1338      564552494659      02570 NEW36      FCC      0
133E      00      02580      FCC      0
133F      414343455353      02590 NEW37      FCC      0
          205041535420
          454E44204F46
          205245434F52
          44
1358      00      02600      FCC      0
          1359
          02610 ERREND EQU *
          02620 * CODE FOR ERROR ROUTINE
          02630
          02640
1359 8E      E100      02650 ERRCOD      LDX      #NEWERR ;New section to go to ROM

```

00000 TOTAL ERRORS

ANDOPC 0084	ERRADD 10BF	NEW0	110B	NEW19	122D	NEW29	12BE	NEWS	115A	OFFSET	D040
BLKMOV 10B2	ERRCOD 1359	NEW1	111C	NEW2	123	NEW3	1138	NEW6	1163	POINT1	138B
BLKSPC 0020	ERREND 1359	NEW10	119E	NEW20	1241	NEW30	12D2	NEW7	1171	PRINT	B99C
BUFFER 13B8	FLAG 13B4	NEW11	11AF	NEW21	124E	NEW31	12E0	NEWS	1180	RAM32K	FFDE
CUS A928	TROVEC 010D	NEW12	11BE	NEW22	125C	NEW32	12EE	NEW9	118E	RAM64K	FFDF
COUNT 13B6	KEYBUF 0152	NEW13	11CC	NEW23	1265	NEW33	1301	NEWERR	E100	ROMEND	E000
DELAY1 001E	KEYCOD 13B4	NEW14	11E0	NEW24	1274	NEW34	1310	NEWKEY	E002	ROMST	8000
DELAY2 0004	KEYEND 13B4	NEW15	11F0	NEW25	1285	NEW35	131F	NEWSIN	C140	RTSOFC	0039
DONE 13AE	LOOP1 1007	NEW16	1203	NEW26	1298	NEW36	1338	NEWVEC	E000	SINON	C125
DSKONT 00FF	LOOP2 1377	NEW17	1212	NEW27	12A9	NEW37	133F	NOFNOP	1212	START	1000
ERREND 1364	LOOP3 13A9	NEW18	1220	NEW28	12B4	NEW4	1144	NUMERR	0002	VERIFY	0987

■ ■ ■

Telewriter-64™

the Color Computer Word Processor

- 3 display formats: 51/64/85 columns × 24 lines
- True lower case characters
- User-friendly full-screen editor
- Right justification
- Easy hyphenation
- Drives any printer
- Embedded format and control codes
- Runs in 16K, 32K, or 64K
- Menu-driven disk and cassette I/O
- No hardware modifications required

THE ORIGINAL

Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with *true lower case characters*. So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

Telewriter's chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter's advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

...one of the best programs for the Color Computer I have seen...

— Color Computer News, Jan. 1982

TELEWRITER-64

But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

64K COMPATIBLE

Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command. The 51 × 24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, *all on the screen at one time*. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

FEATURES & SPECIFICATIONS:

Printing and formatting: Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminus, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

File and I/O Features: ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette auto-retry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

Editing features: Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing "modes." This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

*...truly a state of the art word processor...
outstanding in every respect.*

— The RAINBOW, Jan. 1982

PROFESSIONAL WORD PROCESSING

You can no longer afford to be without the power and efficiency word processing brings to everything you write. The TRS-80 Color Computer is the lowest priced micro with the capability for serious word processing. And only Telewriter-64 fully unleashes that capability.

Telewriter-64 costs \$49.95 on cassette, \$59.95 on disk, and comes complete with over 70 pages of well-written documentation. (The step-by-step tutorial will have your writing with Telewriter-64 in a matter of minutes.) To order, send check or money order to:

Cognitec
704 N. Nob Ave.
Del Mar, CA 92014

Or check your local software store. If you have questions, or would like to order by Visa or Mastercard, call us at (619) 755-1258 (weekdays, 8AM-4PM PST). Dealer inquiries invited.

(Add \$2 for shipping. Californians add 6% state tax. Allow 2 weeks for personal checks. Send self-addressed stamped envelope for Telewriter reviews from CCN, RAINBOW, 80-Micro, 80-U.S. Telewriter owners: send SASE or call for information on upgrading to Telewriter-64. Telewriter-compatible spelling checker (Spell 'n Fix) and Smart Terminal program (Colorcom/E) also available. Call or write for more information.)

Apple II is a trademark of Apple Computer, Inc.; Atari is a trademark of Atari, Inc.; TRS-80 is a trademark of Tandy Corp; MX-80 is a trademark of Epson America, Inc.

TAPE
LOADER

Program Listing. DECB2 — Basic



64 K Disk Extended Color Basic 1.0

```
0 'DISK EXTENDED COLOR BASIC 2.0
  LOADER. *SAVE BEFORE RUNNING!*

10 PCLEAR4: CLS: PRINT@70,"LOADI
  NG DECB 2.0": LN=100: PRINT

20 FOR A=&H1000 TO&H13BF STEP32
30 SM=0: FOR AD=A TO A+31
40 READ B: SM=SM+B: IF B <> (255
  AND B) THEN F=1: GOTO 60 ELSE
  POKE AD,B: NEXT AD
50 READ B: IF SM=B THEN LN=LN+10
  : NEXT A: SAVEM "DECB2",&H1000,&
  H13BF,&H1000: PRINT" DECB 2.0 SA
  VED.": INPUT " PRESS <ENTER> TO
  EXECUTE";DY$: EXEC &H1000: NEW

60 PRINT" * DATA ERROR IN LINE"L
  N: IF F THEN PRINT" VALUE OF"B"O
  UT OF BOUNDS" ELSE PRINT" CHECKS
  UM READ ="B," CALCULATED ="SM

70 PRINT:PRINT " RE-SAVE & RE-RU
  N WHEN FIXED": END

100 DATA 52,1,26,80,142,128,0,18
  3,255,222,236,132,183,255,223,23
  7,129,140,224,0,38,241,124,209,1
  76,124,212,70,124,213,114,142,46
  35

110 DATA 18,18,191,194,111,191,1
  94,112,191,137,2,191,137,3,142,1
  72,90,191,194,118,191,137,9,142,
  16,191,16,142,225,0,206,2,3874

120 DATA 166,189,16,178,142,19,1
  01,16,142,172,90,206,0,11,189,16
  ,178,142,19,112,16,142,224,2,206
  ,0,80,189,16,178,190,1,3348

130 DATA 13,191,224,0,142,224,2,
  191,1,13,134,30,183,19,194,134,3
  2,183,169,41,183,163,24,183,163,
  36,183,163,89,183,161,186,3837
```

PJ inc.
P.O. BOX 813
N. Bergen, N.J. 07047
(201) 330-1898

This is the C-C Bus,

just one of a full line of accessories for your computer. Write or call for our catalog — it will tell you about: the capabilities of the C-C BUS; our WORD-PAK, 80 column video board that is compatible with Flex, OS-9, CP/M or just Basic; our P-C PAK, parallel printer and real time clock interface; the MEM-PAK, Proto CoCo, and the new items we have planned for '84.

We are your one source for all your expansion needs.



UNLIMITED EXPANSION

140 DATA 134,132,183,163,64,134,
191,183,163,65,122,163,61,122,16
3,61,134,2,183,214,111,134,255,1
83,9,135,134,255,183,214,191,124
,4565

150 DATA 193,64,134,57,183,16,0,
189,169,40,142,193,37,189,185,15
6,53,129,166,128,167,160,51,95,1
7,131,0,0,38,244,57,225,3608

160 DATA 75,225,92,225,99,225,12
0,225,132,225,154,225,163,225,17
7,225,192,225,206,225,222,225,23
9,225,254,226,12,226,32,226,48,2
26,5821

170 DATA 67,226,82,226,96,226,10
9,226,129,226,142,226,156,226,17
0,226,185,226,202,226,221,226,23
8,227,0,227,10,227,30,227,44,227
,5502

180 DATA 58,227,77,227,92,227,10
7,227,132,227,139,78,69,88,84,32
,87,73,84,72,79,85,84,32,70,79,8
2,0,83,89,78,84,3252

190 DATA 65,88,0,82,69,84,85,82,
78,32,87,73,84,72,79,85,84,32,71
,79,83,85,66,0,79,85,84,32,79,70

,32,68,2174

200 DATA 65,84,65,0,73,76,76,69,
71,65,76,32,70,85,78,67,84,73,79
,78,32,67,65,76,76,0,79,86,69,82
,70,76,2144

210 DATA 79,87,0,79,85,84,32,79,
70,32,77,69,77,79,82,89,0,85,78,
68,69,70,73,78,69,68,32,76,73,78
,69,0,2086

220 DATA 66,65,68,32,83,85,66,83
,67,82,73,80,84,0,82,69,68,69,70
,73,78,69,68,32,65,82,82,65,89,0
,68,73,2136

230 DATA 86,73,83,73,79,78,32,66
,89,32,90,69,82,79,0,73,76,76,69
,71,65,76,32,68,73,82,69,67,84,0
,84,89,2165

240 DATA 80,69,32,77,73,83,77,65
,84,67,72,0,79,85,84,32,79,70,32
,83,84,82,73,78,71,32,83,80,65,6
7,69,0,2107

250 DATA 83,84,82,73,78,71,32,84
,79,79,32,76,79,78,71,0,83,84,82
,73,78,71,32,84,79,79,32,67,79,7
7,80,76,2237

Discover The Future of Color Computing

THE

Daisy wheel for the 80's

BROTHER HR-15

- 14 CPS • 10, 12, 15, PS Pitch
- 13 inch carriage • Prints 5 copies

Tractor and Sheetfeed available

FROM **\$599.00**

REITZ™

Serial to Parallel Converter

at up to 9600 BAUD

\$59.95

Three New Fonts For Your
**EPSON, GEMINI, DMP OR
OKIDATA PRINTER FROM**

Sugar Software

Print **COLOR CALLIGRAPHY**

- Gay Ninetys
- Cartoon
- Old English Fonts

Tape

\$24.95

32K

Disk

\$29.95

NEW From 80 Custom Software

BUSINESS MANAGER

28 Accounts

300 Transactions

Balance Sheets — monthly/yearly

TAPE **\$24.95**

DISK **\$29.95**

1-(800)-242-2626 (Outside Ohio)

1-(419)-537-1432 (Inside Ohio)

REITZ™
COMPUTER CENTER™

3170 W. Central Ave.
Westgate Meadows Shopping Center
Toledo, Ohio 43606



Please include phone number with all orders. Include \$5.00 for all hardware orders and \$2.00 for all software orders. Ohio residents please add 6% state sales tax.

HARDWARE SPECIALS

26-3027 Extended CoCo 2 16k.....	\$189.95
26-3127 64k Extended CoCo.....	\$249.95
26-1261 TP-10 Thermal Ptr.....	\$89.95
26-1192 CGP-115 Printer.....	\$174.95
26-1175 RS D.C. Modem 1.....	\$89.95
26-1173 RS D.C. Modem 2.....	\$179.95
Novation J-CAT Modem.....	\$129.95
RS D.C. Modem 1.....	\$89.95
RS D.C. Modem 2.....	\$179.95
Hayes SM300 Smartmodem.....	\$239.95
USR 300/1200 Password.....	\$449.95
26-3024 Multipac Interface.....	\$149.95
26-1271 DMP 110 Printer.....	\$379.00
Botec SER/PAC Interface.....	\$69.95

ACCESSORIES

6-3018 Extended Basic.....	\$39.95
26-3030 OS9.....	\$64.95
26-3036 BASIC 09.....	\$87.95
64k Memory Upgrade Kit.....	\$59.95
26-3029 CoCo 2 Drive 0.....	\$349.95
26-3023 Drive 1, 2, 3.....	\$239.95
Video Plus.....	\$24.95
Video Plus II.....	\$27.95
Gorilla BW Monitor, Green or Amber.....	\$119.95
Amdek Color I Monitor.....	\$325.95
Amdek Disk Drive.....	\$499.95
26-3012 Deluxe Joystick.....	\$35.95
Super Pro Keyboard Kit.....	\$64.95
HJL-57 Keyboard.....	\$79.95
MSI Color Finance II (disk only).....	\$69.95
MSI Color Finance I (disk only).....	\$49.95
MSI Calendar (disk only).....	\$19.95
MSI Namefile (disk only).....	\$19.95
MSI Disk Utility.....	\$19.95
Verbatim Disks—Box of 10.....	\$27.95
Elephant Memory Disks—Box of 10.....	\$22.95

TOLL FREE

1-800-251-5008

TENNESSEE

1-800-545-2502



DELKER ELECTRONICS, INC.
408 C NISSAN BLVD.
P.O. BOX 897, DEPT. C
SMYRNA, TN 37167

Prices do not include shipping.
All items subject to availability.

All of the above units covered by
out 120 day carry in warranty.
Write for free newsletter. TRS-80
Trademark Tandy Corporation.
Prices subject to change without
notice.

260 DATA 69,88,0,67,65,78,39,84,
32,67,79,78,84,73,78,85,69,0,66,
65,68,32,70,73,76,69,32,68,65,84,
65,0,1968
270 DATA 65,76,82,69,65,68,89,32
,79,80,69,78,0,68,69,86,73,67,69
,47,68,82,73,86,69,32,78,85,77,6
6,69,82,2198
280 DATA 0,73,78,80,85,84,47,79,
85,84,80,85,84,0,66,65,68,32,70,
73,76,69,32,77,79,68,69,0,70,73,
76,69,2076
290 DATA 32,78,79,84,32,79,80,69
,78,0,73,78,80,85,84,32,80,65,83
,84,32,69,78,68,0,68,73,82,69,67
,84,32,2077
300 DATA 83,84,65,84,69,77,69,78
,84,0,85,78,68,69,70,73,78,69,68
,32,70,85,78,67,84,73,79,78,0,78
,79,78,2232
310 DATA 69,88,73,83,84,69,78,84
,32,70,73,76,69,0,66,65,68,32,82
,69,67,79,82,68,32,78,85,77,66,6
9,82,0,2115
320 DATA 68,73,83,75,32,70,85,76
,76,0,79,85,84,32,79,70,32,66,85
,70,70,69,82,32,83,80,65,67,69,0
,87,82,2106
330 DATA 73,84,69,32,80,82,79,84
,69,67,84,0,66,65,68,32,70,73,76
,69,32,78,65,77,69,0,66,65,68,32
,70,73,2017
340 DATA 76,69,32,83,84,82,85,67
,84,85,82,69,0,65,76,82,69,65,68
,89,32,69,88,73,83,84,83,0,70,73
,69,76,2212
350 DATA 68,32,79,86,69,82,70,76
,79,87,0,83,69,84,32,84,79,32,78
,79,78,70,73,69,76,68,69,68,32,8
3,84,82,2200
360 DATA 73,78,71,0,86,69,82,73,
70,89,0,65,67,67,69,83,83,32,80,
65,83,84,32,69,78,68,32,79,70,32
,82,69,2080
370 DATA 67,79,82,68,0,142,225,0
,58,174,132,189,185,156,18,18,52
,54,142,1,82,49,141,0,75,198,8,1
11,141,0,65,99,2811
380 DATA 141,0,61,166,128,161,16
4,39,14,111,141,0,51,52,2,134,30
,167,141,0,45,53,2,167,160,90,38
,231,109,141,0,32,2771
390 DATA 39,24,106,141,0,28,38,1
8,134,4,167,141,0,20,142,1,82,19
8,8,134,255,167,128,90,38,251,53
,54,110,159,224,0,2954

Program Listing. Goodman's Patch.



16 K disk Extended Color Basic 1.0
Macro 80C Editor Assembler
Eprom Programmer

```

0001 0E00      NAM      PATCH
* ADDRESS OF DATA IN LOW RAM *
* WHEN IT IS BEING PATCHED. *
LORAM EQU $2000
OFFSET EQU $C000-LORAM

0002 2000
0003 A000

* PATCH SEEK TRACK ROUTINE TO *
* RESTORE HEAD TO ZERO IF THIS *
* IS THE FIRST TIME THIS DRIVE *
* WAS SELECTED. *
ORG $D714-OFFSET
JSR PATCH1+OFFSET

0004 0E00
0005 3714 BDD7DD

ORG $D7DD-OFFSET
PATCH1 CMPB #$FF FIRST USE OF
      BNE A@ THIS DRIVE?
      PSHS X PRESERVE X REG.
      JSR $D6C5 GO TO TRACK 0
      PULS X
      CLRB
      STB $FF49 SET B=TRACK 0
      RTS SET TRACK #.

A@
0012 37E8 5F
0013 37E9 F7FF49
0014 37EC 39

* PATCH SELECT DISK ROUTINE TO *
* DELAY APPROX. 80 MS. WHENEVER *
* A DIFFERENT DRIVE IS SELECTED *
* TO ALLOW FOR HEAD SETTTLING ON *
* DRIVES WITH HEAD SOLOINIDS. *
ORG $D68F-OFFSET
JSR PATCH2+OFFSET
STA $986
REORG

0015 37ED
0016 368F BDD7ED
0017 3692 B70986
0018 3695

PATCH2 STA $FF40 SELECT DRIVE.
      EORA $986 DIFFERENT
      BITA #$47 DRIVE?
      BEQ A@ SKIP IF SAME.
      JSR $D6FD DELAY 80MS.
      EORA $986 RESTORE MASK.
      RTS

* PATCH INITIALIZATION ROUTINE *
* SET ALL TRACK #'S TO $FF FOR *
* FLAG TO INDICATE DRIVE NEVER *
* USED BEFORE & TURN VERIFY ON. *
* ALSO DO AUTO-BOOT IF SPC BAR *
* HELD DOWN DURING WARM RESET. *
ORG $C0D1-OFFSET
JMP PATCH3+OFFSET
REORG

0019 37ED B7FF40
0020 37F0 B80986
0021 37F3 8547
0022 37F5 2703
0023 37F7 BDD6FD
0024 37FA B80986
0025 37FD 39

0026 37FE
0027 20D1 7ED7FE
0028 20D4

0029 37FE CCEFFF
0030 3801 FD097E
0031 3804 FD0980
0032 3807 B70987
0033 380A 8612
0034 380C 9796
0035 380E 8D09
0036 3810 7EA0E2

PATCH3 LDD #FFFF SET ALL
      STD $97E TRACKS TO $FF
      STD $980 VERIFY ON
      STA $987 SET PRINTER
      LDA #18 BAUD=2400
      STA 150 CHECK BOOT
      BSR CKBOOT CHECK BOOT
      JMP $A0E2 NORMAL START

* PATCH WARM START ROUTINE TO *
* CHECK KEYBOARD -- AUTO-BOOT *
* WHEN SPACE BAR HELD DOWN *
* DURING WARM RESET. *
ORG $C0CC-OFFSET
LDX #PATCH4+OFFSET
REORG

0037 3813
0038 20CC 8ED813
0039 20CF

0040 3813 12
0041 3814 8D03
0042 3816 7EC0D4

PATCH4 NOP FOR RESET
      BSR CKBOOT CHECK BOOT
      JMP $C0D4 NORMAL WARM

* CHECK KEYBOARD, IF SPACE BAR *
* HELD DOWN THEN SET VECTOR TO *
* 'DOBOOT' AT LINE INPUT TRAP. *
CKBOOT LDA #$7F CHECK IF
      STA $FF02 SPACE BAR IS
      LDB $FF00 DEPRESSED.
      LDA $FF0 RESET KEYBD.
      STA $FF02
      ANDB #8 SKIP IF SPACE
      BNE A@ NOT PRESSED.
      LDX #DOBOOT+OFFSET
      STX $183 LINE IN TRAP
      RTS

A@
* VECTOR HERE FOR FIRST INPUT *
* LINE AFTER AUTO-BOOT. THE *
* NORMAL VECTOR IS RESTORED, *
* THEN A POINTER TO THE BOOT *
* LINE IS RETURNED. *
DOBOOT LEAS 2,S CANCEL RETURN
      LDX #C687 RESTORE
      STX $183 VECTOR
      LDX #BOOT+OFFSET-1
      CLRA CLEAR CARRY
      RTS RUN BOOT

* LINE RETURNED TO BASIC FOR *
* AUTO-BOOT. BASIC EXECUTES *
* THIS JUST AS IF IT WAS TYPED *
* FROM THE KEYBOARD. *
BOOT FCC /RUN*BOOT"/,0
      END

```


SYSTEM H

Examining the intersection of



Illustration by Marjorie Strates

Marjorie Strates

ORIZONS



commands and operating systems.

by Stephen P. Allen

INSIDE YOUR COLOR Computer, as in all computers, is an operating system (OS) that takes control when the computer is turned on. The operating system in the Color Computer is Basic. Basic essentially has two parts — first, it is a controller, making sure computer hardware is set up correctly, allocating memory space, keeping track of where the computer “is” at all times. The second part is a collection of routines and subroutines that execute Basic commands.

Let’s examine the routine that is invoked when you List a Basic program.

List actually starts with LIST, and is also called from CSAVE, A. We’ll look at a few commands relating to these routines. Turn on your disassembler and have a look . . .



Find The Tokens

Microsoft Basic is a tokenized Basic. What does that mean? Type in a line in Basic. When you hit Enter, the operating system examines the line for Basic words (FOR, NEXT, IF, etc.) and converts them into numbers. These numbers are called *tokens*. Tokens make the program a lot easier to execute at run time, because the token contains vital information concerning the location of the word's routine in the ROM. Half the work of decoding the word and finding the routine is done by the time the program runs.

Tokens conserve memory. LIST is a four letter word. \$94 (the token for LIST) takes one quarter the memory space.

In order to LIST — indeed, in order to run Basic at all — the system must know what is a token and what isn't. This is how Microsoft does it:

An element in a Basic program is either ASCII or a token. ASCII uses only the least (rightmost) seven of eight bits. If you look at any ASCII digit as a two's complement number, it is always positive. Microsoft craftily said, "OK then, we make all our tokens negative!" A token (in its simplest form) is an offset into a table, with \$80 added (setting the sign bit) to make it negative and so distinguish it from ASCII.

However, that is not all there is to it. There are some tokens with two bytes. The first byte is either \$FF or \$3A. \$FF is used to differentiate between several token tables.

\$B7DF in Figure 1 shows a trick Microsoft uses a lot: CMPX #8621 does nothing. Skip the CMPX# opcode, however (branch to \$B7E0), and \$8621 loads A with an exclamation point. This is the symbol Basic uses for a token it couldn't find a word for (try listing a tokenized disk program on a Color Computer without disks).

Find The Word

At this point things get a little complicated. There is a "Table of Tables" in Basic reserved RAM. This table is used by the operating system to locate the tables

of keywords and subroutine addresses in ROM. As part of the initialization process, Color Basic moves some data concerning its token tables down into RAM. If you have Extended or Disk Basic, those ROMs copy their token table data next to the first.

The address of the Table of Tables is \$120. Figure 2 shows it for Extended Basic. At \$125 and \$12F are tables for

two-byte tokens, where the first byte is \$FF.

Microsoft again cleverly uses the seven-bit ASCII code, this time to mark the end of a Basic word in the ROM tables. It does this by setting the left-most bit of the last letter, so that the last letter is negative. Thus, ASC is not \$41, \$53, \$43 but \$41, \$53, \$C3. Figure 3 shows how all these tables are used by LIST.

B7C2	JSR	\$1A6	RAM hook, RTS in Extended BASIC
	LEAX	4,X	Point to start of line contents
	LDY	#2DD	Decoded test will be copied to here
B7CB	LDA	,X+	Next line element
	BEQ	\$B820	RTS if done this line
	BMI	\$B7E6	If token
	CMPA	#3A	Is this an oddball?
	BNE	\$B7E2	No
	LDB	,X	Check next byte
	CMPB	#\$84	"ELSE"?
	BEQ	\$B7CB	Yes
	CMPB	#\$83	"'" (remark)?
	BEQ	\$B7CB	Yes
B7DF	CMPX	#\$8621	\$8621 is LDA #21 (ASCII for "!")
B7E2	BSR	\$B814	Store this non-token character
	BRA	\$B7CB	Do next element

Figure 1. A Microsoft Trick

Figure 2. "Table of Tables"

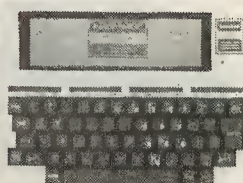
120	35	54 entries this table
	AA66	BASIC words start here
	AB67	Subroutine addresses start here
125	14	20 entries this table
	AB1A	BASIC words start here
	AA29	Subroutine addresses start here
12A	19	25 entries this table
	8183	Extended words start here
	813C	Address of special routine to find addresses
12F	0E	14 entries this table
	821E	Extended words start here
	8168	Address of special routine to find addresses

Figure 3. Table User code uses Figure 2 to locate the proper table and copy the word from it.

B7E6	LDU	#\$116	Table of tables minus 10: prep for loop
	CMPA	#\$FF	Is token found in 2nd or fourth table?
	BNE	\$B7F1	No
	LDA	,X+	Move past \$FF, get "real" token
	LEAU	5,U	Move into tables for "\$FF" tokens
B7F1	ANDA	#\$7F	Drop MSB, make into an offset
B7F3	LEAU	\$0A,U	Move up two tables
	TST	,U	End of table of tables?
B7F7	BEQ	\$B7E0	Yes, can't find that word!
	SUBA	,U	Is it in this table?
	BPL	\$B7F3	No, try the next one
	ADDA	,U	This table: restore offset
	LDU	1,U	Point U to word table
B801	DECA		Use token as offset
	BMI	\$B80A	Found the word: copy to buffer
B804	TST	,U+	Not the word: move
	BPL	\$B804	past it and point U
	BRA	\$B801	to next word
B80A	LDA	,U	Get a letter from word
	BSR	\$B814	Put it in buffer
	TST	,U+	Was that the last letter?
	BPL	\$B80A	No, keep going
	BRA	\$B7CB	Done, get next line element
B814	CMPY	#\$3D6	249 characters in buffer already?
	BHS	\$B820	Yes: no room
	ANDA	#\$7F	Mask MSB (for last letter)
	STA	,Y+	Into the buffer
	CLR	,Y	Mark possible end of string
B820	RTS		

From Computer Plus to YOU...

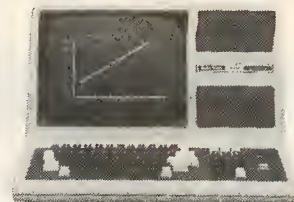
PLUS after PLUS after PLUS



Model 100 8K \$679
Model 100 24K \$835



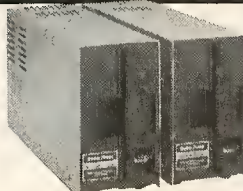
Color Computer II 16K \$135
w/16K Ext. Basic \$165
w/64K Ext. Basic \$210



Model 4 16K \$849
Model 4 64K
2 Disk & RS232 \$1699



DMP120 \$395
DMP200 \$520



Color Computer Disk Drive
Drive 0 \$329 Drive 1 \$235



DWP210 \$629

BIG SAVINGS ON A FULL COMPLEMENT OF RADIO SHACK COMPUTER PRODUCTS

COMPUTERS

Model 4 Portable	
64K w/2 Drives	1525
Pocket Computer 2	165
Model 2000 2Dr	2299
Model 12 1 Drive	2360
Model 16B 1Dr 256K	3965

MODEMS

Hayes Smartmodem II	225
AC-3	129
DC Modem I	89
DC Modem II	160

PRINTERS

Silver Reed EXP500 D.W. Ser.	455
Silver Reed EXP550 D.W. Par.	575
CGP115	159
CGP220 Ink Jet	545
DMP110	305
DMP420	735
Gemini 10X	300
Gemini 15X	405
CITOH Prowriter	359
Okidata	CALL
Epson	CALL

ETC.

Disk Drive Controller	139
Extended Basic Kit	35.95
Botek Ser/Par Conv.	69
64K Ram Chips	62.95
Deluxe Keyboard	35.95
Superpro Keyboard	69.95
HJL Keyboard	79.95
CCR-81 Recorder	52
Deluxe Joystick (each)	35.95
Joysticks (pair)	22
Video Plus (monitor adapter)	24.95
Video Plus IIM	26.95
Amdek Color 1+ Monitor	299
BMC Color Monitor	259
BMC Green Monochrome Monitor	105
Taxan Green Mono. Monitor	130
Taxam Amber Mono. Monitor	139

SOFTWARE

	(Tape Version)
Zaxxon	34.95
The King	26.95
Trap Fall	27.95
Buzzard Bait	27.95
Devil Assault	27.95

Colorpede	29.95
Juniors Revenge	28.95
Pac Attack	24.95
Block Head	26.95
Froggie	24.95
Lunar Rover Patrol	24.95
Lancer	24.95
Typing Tutor	23.95
Galagon	24.95
Scott Adams Adventures	19.95
Sea Dragon	34.95
Colorcome	49.95
Telewriter 64	49.95
O-Pak (disk)	34.95
Key-264K	35.95
Elite-Calc	59.95
VIP Writer	59.95
VIP Calc	59.95
VIP Terminal	49.95
VIP Database (disk)	59.95

Order any 2 software pieces listed and take 10% off their listed price. All Radio Shack software 10% off list. Send for complete list.

**CALL TOLL FREE
1-800-343-8124**

- LOWEST POSSIBLE PRICES
- BEST POSSIBLE WARRANTY
- KNOWLEDGEABLE SALES STAFF
- TIMELY DELIVERY
- SHOPPING CONVENIENCE



**computer
plus**

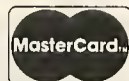
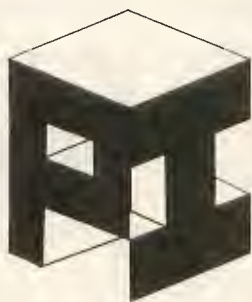
P.O. Box 1094
480 King Street
Littleton, MA 01460

SINCE 1973

IN MASSACHUSETTS CALL (617) 486-3193

PROGRAMS INTELLECT Educational Software

PROGRAMS
INTELLECT



P.O. Box 4282
Westboro, MA 01581

(617) 366-6544

Circle No. 146 on Reader Service Card

H.S. & Co. presents

Personal Accounts Manager

formerly Home
Accountant

for use on Tandy Color Computer*
and TDP-100.* *TM of Tandy Corp.

Balances checkbook, reconciles bank statement, and updates
budgetary categories in minutes.

Easy check entry and check modification.

Enter cleared check numbers from bank statement and the system
is updated from that list.

80 standard budget categories and 20 multiple categories are easily
set up and updated at your command.

Summary sheets are printed for checkbook entries, bank statements,
individual categories and category recap.

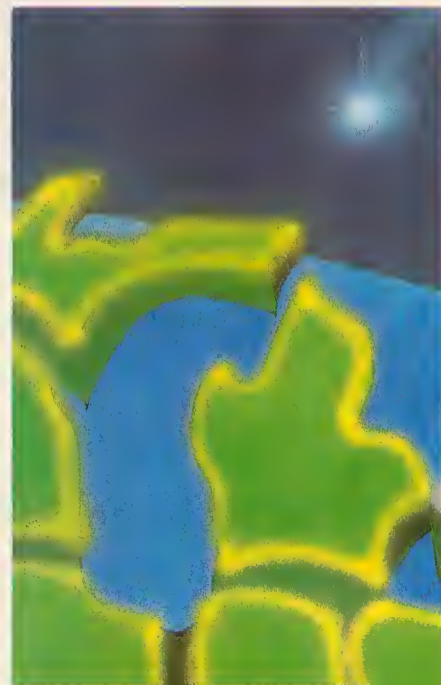
For use on 32K Extended BASIC system with 1 or 2 disk drives.
Printer recommended.

HOME ACCOUNTANT software (disk) & manual \$65.00
Manual Only \$7.00 (refundable with purchase)

Add \$2.00 for shipping.
CO residents add 5.75% tax.
Check or M.O. — Allow 2 wks.
for personal checks.

HS & Co.
111 E. Drake, Suite 7001
Ft. Collins, CO 80525
303-493-2359

Circle No. 35 on Reader Service Card



The Subroutine at \$9F

Probably the most often-called routine in the Color Computer is copied from ROM into the *scratchpad* area Basic reserves for itself whenever the computer is turned on. (The scratchpad area is low RAM, from \$0000 through \$03FF. It gets used for storing pointers, temporary results, file names, addresses, counters, and buffers. Refer to Jake Commander's Memory Map, April 1983.) This routine is located at \$9F, and its purpose is to get the next character in a Basic line (skipping spaces), put it in the A register, and set some flags according to what kind of character it is. It's in RAM because it's a *self-modifying* routine — that is, it alters its own code.

This routine reports that there is no next character at a colon or end of line by setting the zero flag to 1, and that the next character is an ASCII digit by setting the carry flag to 1. If the Basic interpreter needs to know the current character instead of the next one, it can call this routine at \$A5 instead of \$9F.

To execute a tokenized Basic word, the interpreter uses the token to examine the Table of Tables to find the correct table of execution addresses. Then the corresponding table address is pulled (using the remainder of the token's value) and the routine at \$9F is called before jumping to the token's address.

In this way all instruction subroutines are entered with the next character in A and flags set according to what that character is. Many routines start with a conditional branch based on the \$9F call

results. List is one of them, though the branch doesn't appear for six instructions.

Getting Parameters

Figure 4 is the assembly language routine that gets the line number parameters. To get the line numbers that *may* have been typed after the List command itself, the flags set by the \$9F routine come in handy. The general-purpose ASCII to binary routine at \$AF67 is also used to advantage. It returns a value of zero if no number is found, and so is called before branching on the \$9F routines flags. This provides the "implied first line" feature. The first line number to be listed is stored at \$66 and the last line number to list is stored at \$2B.

\$AF67 uses the \$9F routine to get ASCII digits to work on, and quits when

it runs out of them. When it returns, \$A6 points to the next character beyond the number. If you execute JSR \$9F at this point, you skip the next character. This is why Basic calls \$A5 at \$B772 instead of \$9F.

Main Loop

The main loop of the List routine is concerned with processing lines of Basic. It calls subroutines that deal with the elements in the lines (see Figure 5). Here is the format for a line of a Basic program in memory: address of next line (two bytes); number of this line (two bytes); the contents of the line; and zero, marks end of line (one byte).

There's a lot going on, isn't there! Think of the incredible amount of processing that occurs next time you simply List a Basic program. ■ ■ ■

LLIST	ORG	\$B75E	
	LDB	#\$FE	#-2
	STB	\$6F	to DEVNUM
	JSR	\$A5	Restore any modified flags
LIST	PSHS	CC	Save the flags
	JSR	\$AF67	Line # to \$2B
	JSR	\$AD01	Find line, or next larger one
	STX	\$66	Start line; put it here
	PULS	CC	What was that first character?
B772	BEQ	\$B784	Oh, list ALL lines!
	JSR	\$A5	Get char. after number
	BEQ	\$B789	List one line only
	CMP	#\$AC	Token for "--"
	BNE	\$B783	Gotta have a dash here!
	JSR	\$9F	Check for 2nd line #
	BEQ	\$B784	There ain't any
	JSR	\$AF67	Get "to" line #
	BEQ	\$B789	Nothing after "to" line: very good
B783	RTS		Abort! Syntax Error!
B784	LDU	#\$FFFF	Max # possible
	STU	\$2B	to end line
B789	LEAS	2,S	This is no longer a subroutine

Figure 4. Parameter Parsing in List

B78B	LDX	\$66	Address of first line
B78D	JSR	\$B95C	Open file for CSAVE,A: else do linefeed
	JSR	\$A549	Check for Break, Shift @
	LDD	,X	If last line, D gets zero
	BNE	\$B79F	Not last line yet
B797	JSR	\$A42D	Done: close files if CSAVE,A
	CLR	\$6F	Make sure output goes to screen
	JMP	\$AC73	"OK"
B79F	STX	\$66	Address of current line
	LDD	2,X	Get line #
	CMPD	\$2B	Have we already done last line?
	BHI	\$B797	Yes
	JSR	\$BDCC	Convert line # to ASCII string
	JSR	\$B9AC	Print it
	LDX	\$66	Point to line
	BSR	\$B7C2	De-tokenize, copy to 2DD
	LDX	[66]	Address of next line
	LDU	#\$2DD	Point to buffer
B7B9	LDA	,U+	Get character
	BEQ	\$B78D	If done this line
	JSR	\$B9B1	JMP "Chrout"
	BRA	\$B7B9	Next character

Figure 5. Main Loop of List

ANNOUNCING SPEED READING



Busy executives! Students! Increase your reading speed dramatically.

Best available speed reading program for the CoCo. Reading material appears on the TV screen at the speed you select, training you to read faster. You can even vary the speed while reading.

Complete with 6 different text selections. Plus a drill to improve visual span and perception.

Send SASE for **free** copy of 3-page printout of instructions, including many tips to help you read faster.

On cassette tape for 16K Color Computer. Standard or Extended Basic. \$17.95 incl. postage. PA residents add \$1.08. Send check to Dept. C, P.O. Box 210, Jenkintown, PA 19046.

b&b software

Circle No. 104 on Reader Service Card

CHATTANOOGA CHOO CHOO SOFTWARE



Buy 1 Program Get 10% Off Track 29
Buy 2 or More Programs
Get 15% Off

<p>† Early Games Preschool Learning Games (16K) Tor D \$25.45 ea.</p> <p>Spectral Associates Color Panic (32K) Ms Gobbler (32K) Lancer (32K) Lunar Rover (32K) Pengon (16K) \$24.95 ea.</p> <p>Tom Mix Software * Donkey King (32K) \$26.95 * Space Shuttle (32K) \$28.95 Cu'ber (32K) * Buzzard Bait (32K) \$27.95 ea.</p> <p>Computerware NEW Video Plus \$24.95 * Junior's Revenge (32K) \$28.95</p>	<p>NEW † Candy Co. (32K) Tor D \$29.95 ea.</p> <p>† Prickley-Pear Software Disk Omni Clone \$31.95 Tape Omni Clone \$23.95</p> <p>† NEW Colorware Real Talker Disk Compatible Hardware Voice Synthesizer \$59.95 ea.</p> <p>Text to Speech Program included (16K, 32K, 64K)</p> <p>Kraft Joystick The Best \$39.95 ea. 1 Year Warranty NEW Gold Connectors for Disk controller \$16.95</p> <p>† Datsoft, Inc. Zaxxon (32K) Tor D \$31.50 ea. Pooyan (32K) \$29.95 (Tape & Disk)</p>
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

We Pay Shipping!

† No Other Discounts Apply

* Also available on disk (32K) at extra charge. Send for free complete listings! TN residents add 7.25% sales tax, C.O.D. orders add \$2.00.



(615) 875-8656
P.O. Box 15892
Chattanooga, TN 37415



Circle No. 7 on Reader Service Card



Checks are held for clearance.
Calif Residents add 6% sales tax

means Quality



STAR TRADER

STAR TRADER is a graphics adventure & simulation you can play again & again! You assume the role of a merchant ship captain in the far future. You travel between solar systems in **REAL TIME**, trading cargo, encountering pirate ships, stopping at starports for news or fuel or repairs, & making money. Your goal is to collect 1,000 credits so you can retire in luxury from the fast-paced, even dangerous world of solar merchants. Your graphics cockpit shows gauges & read-outs of your location, current damage status, credit balance, cargo destination & due date, the location of nearby starships, fuel & laser power levels, & the current date. While traveling you **JUMP** through hyperspace; **THRUST** within the solar system; use **CARGO** for picking up, delivering, illegally selling or dumping cargo; go to **STARPORT** where you buy fuel & repairs; **BATTLE** with nearby starships; or pick up unrefined fuel at **GAS GIANTS**. As you travel & battle your reputation will effect your future activities too! With different skill levels & many variable factors, **STAR TRADER** offers the excitement & challenge of a new game every time you play! (Requires 32K on cassette or 64K on disk with one joystick or mouse & Extended Basic.)
Cassette \$24.95

Disk \$27.95

COLOR BASIC COMPILER

Now with Strings!!!

If you have ever written a BASIC program only to find that it runs too slow to provide any action & haven't had the courage to learn assembler, then The Color Compiler is the answer. It lets you write your program in easy Basic and then converts it into fast machine language. After you run your compiled program, you may find it necessary to add some delays because the Color Compiler will make your program run an average of 40 times faster!

The Color Compiler features a total of 55 commands and functions. Most of these are a subset of Extended Color Basic. The Color Compiler is limited to integer variables. All floating point can be done in a Basic program which calls the compiled program. Passing information from Basic to compiled programs is very easy. **And Strings are fully supported!** The Color Compiler generates position independent code so that you may put the compiled program anywhere in memory, including into a ROM-pack. It requires 32K and a disk drive, leaving 16K of user work space. (Room for a program with up to 200 lines and 100 line references.)

\$39.95

Functions Supported

ABS	INKEY\$	JOYSTK	PEEK	PEEK#
PPOINT	RND	SGN	SQR	TIMER
+	-	*	/	=
=	=	AND	OR	NOT
ASC	LEN	VAL	CHR\$	MID\$
STR\$				

Instructions Supported

CIRCLE	CLS	COLOR	DATA
DIM	END	EXEC	FOR-STEP-NEXT
GET	GOSUB	GOTO	IF-THEN-ELSE
LET	LINE	MOTOR	ON n GOTO or GOSUB
PAINT	PCLS	PCOPY	Pmode
POKE	POKE#	PRESET	PRINT
PSET	PUT	READ	PRINT@
REM	RESTORE	RETURN	SCREEN
SOUND			



FOXY GRAF

FOXY GRAF is a complete graphics development package for the assembly language programmer. The very comprehensive manual covers the history of graphics, how the Color Computer graphics work, details Radio Shack & Motorola wouldn't tell, & is written in an enjoyable style. You can program with any mode in any color combination. It is totally relocatable & includes some very useful subroutines you can call from standard Basic. If you are serious about learning graphics programming, Foxy Graf is both a tutorial & a tool! (Requires 16K)
Cassette \$29.95

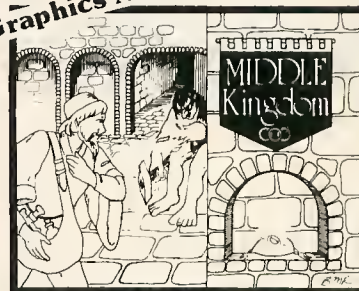
Disk \$34.95

The same **Junior** you've seen in the **Kong** arcade series! This young but tireless little ape must overcome four screens of obstacles to rescue his father, The King, from mean old Luigi. He will traverse the jungle & swamp, climb vines, avoid vine gators, dodge Zuzu birds, open locks, & finally conquer Luigi's hideout before he finally frees his big daddy. (Requires 32K & a joystick)
Cassette \$27.95

Disk \$31.95



NEW Graphics Adventure



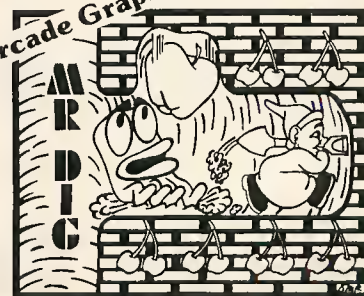
MIDDLE KINGDOM

In this real time graphics adventure set in Medieval times, your goal is to become ruler of the Middle Kingdom, which can be achieved only by returning the three Magic Rings to the Sanctuary. You must search the rooms of the Catacombs, Temple & Pyramid. Be warned! Trolls, monsters, & dangers lurk in these rooms! (Requires 32K)

Cassette \$24.95

Disk \$27.95

Arcade Graphics



MR. DIG

Cherry pickin', tunnel diggin', bad-guy chasin', fast moving fun—**DO** it all with **MR. DIG**!! Help this little wizard harvest his cherry crop by guiding him through the orchard and away from the bad hunters. If they get too close, squish them with a falling apple or bounce your magic orb their way. If you capture the extra treats you get extra points - and extra chompers that chase Mr. Dig! When all the **DIGGIN's** been **DUG**, go on to a new screen full of challenges! All the fun is in detailed hi-res color graphics & accompanied by music. Everyone who plays Mr. Dig falls in love with this cute little fella -and his game! (Requires 32K & a joystick)

Cassette \$27.95

Disk \$30.95

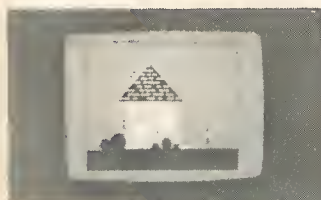


DON'T LET YOUR KIDS GO TO SEED THIS SUMMER



*With entertaining educational software from TRIAD PICTURES
the learning will go on all summer long.*

EDUCATION



DIGIDOTS

Colorful dots and numbers teach addition and subtraction in a unique and entertaining way. A child gains two related subtraction facts for each addition fact learned. With the computer's encouragement students advance at their own rate. Automatic replay of missed problems.

16K/EXT.

CASS. \$14

from 1 X 1, all the way through 12 X 12. Must be used with SUPERFLASH (see above).

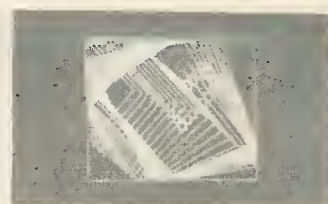
will keep you on the edge of your seats. One or two players.

16K/EXT./JSTKS

CASS. \$12

SUPERFLASH DIVISION TABLES

Who ever heard of DIVISION TABLES? So many students do not do well in the higher grades because of this oversight. Must be used with SUPERFLASH (see above).



FRACTIONS = DECIMALS = PERCENT

Teaches 95 different fractional values and their equivalents in DECIMALS, FRACTIONS and PERCENT! Example: $4/5 = .8 = 80\%$. Help your child in this important area. It could even help you! Must be used with SUPERFLASH (see above).

ALPHABET STEW

Youngsters will LOVE this never-ending "stew" of animated sights and sounds. Even kids as young as 18 months squeal with delight when the computer responds to THEIR touch! Press any key and get an animated picture. Press the same key again and a DIFFERENT picture appears. Number keys play musical notes which are displayed on the screen. Kids of all ages will use it for hours!

32K/EXT.

CASS. \$22

ACCESSORY SOFTWARE for SPELLING LIST & SUPERFLASH

Add POWER to your learning with these unique cassettes.

\$10 FOR ONE.

\$5 FOR EACH ADDITIONAL CASSETTE
IF ORDERED AT THE SAME TIME.

PRE—PROGRAMMED WORD PACKAGES

Ready to use with SPELLING LIST (see above). Based on the principle of ASSOCIATION, essential to the learning and retention of facts. Words are grouped according to their letter patterns. LEVELS 1 to 4 (specify level) level corresponds approx. to grade

COMMONLY MISPELLED WORDS

Learn them all . . . easily! Used with SPELLING LIST (see above). A must for the student or adult whose goal is to become more literate.

SUPERFLASH ADDITION

Gain SPEED and ACCURACY with one-and-two-digit numbers. Students progress until they may even be adding two double-digit numbers MENTALLY, and with ease! Must be used with SUPERFLASH (see above).

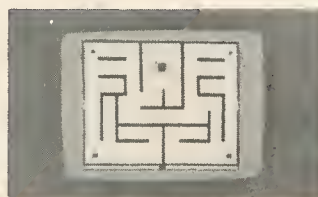
SUPERFLASH SUBTRACTION

Make your child a whiz at subtracting double-digits . . . in their head! Designed by a Mathematics teacher with an extensive background in educational psychology. Must be used with SUPERFLASH (see above).

SUPERFLASH TIMES TABLES

Learn the "Times-Tables" the EASY, EFFECTIVE way! Covers the tables

AND WHEN IT'S TIME TO PLAY



SPLAATT!

A delightful new twist on the "combat tank" theme. "SPLAATT" your opponent WITH PAINT before he Splaatt you! Progress thru seven imaginative "zones" such as 'PEEK—A—BOO', 'HIGH NOON', and 'HELTER SKELTER'. Play against a friend - or the computerized 'SPLAATT—MAN'.

32K/EXT./JOYSTICKS

CASS. \$22

TRACER

The fastest action around! This slap-bang crash-filled dash for the prize

TIME WARP

See how fast you can streak thru the twisting, turning TIME WARP and escape to the worlds beyond. Blast those deadly ALPHA WAVES before they annihilate you! A VERY colorful and challenging game with STUNNING graphics. Never the same screen twice!

16K/EXT./JSTKS

CASS. \$14

JEEPERS REAPERS!

Take a wild ride thru a treasure laden field! Your revved-up reaper gobbles grass as you race for the gold. Play against a human opponent or take on the ominous BLACK REAPER. Beat them to the treasure before the RED PHANTOM snatches it away! Never the same screen twice! 25 levels of play.

16K/EXT.

CASS. \$16

ETCH—A—DOT

Let your imagination run wild! Create your own pictures in a fantasy of color! Even KIDS will have no trouble controlling THIS drawing program. Arrow keys guide the cursor with perfect accuracy. "Blank line" lets you move the cursor without erasing. All 9 colors are at your fingertips - no complicated codes to learn - just hours of FUN. Save your favorite creations on cassette.

16K/EXT./JSTKS

CASS. \$14

SUPERFLASH!

Computerized super 'flash cards' - the most effective learning method. A fast, easy way to learn ANYTHING! Enter your own list, up to 300 items! Easily saved on cassette. The computer compliments or corrects as you go. Score and completion time are both displayed so you can play against yourself. Even replay the missed cards. You'll love this one!

16-32K/EXT.

CASS. \$14

NUMBER POWER

Help your child gain SPEED AND ACCURACY in addition and subtraction. Students progress at their own rate. Continual computer encouragement and generous review of missed problems.

16K/EXT.

CASS. \$14

SPELLING LIST

The ideal way to master spelling. Enter your own words or use your child's spelling list from school. Ample encouragement and review. Save lists on cassette.

16K/EXT.

CASS. \$12



...FROM THE ENTERTAINMENT
COMPANY THAT KNOWS EDUCATION

triad pictures corp.

P.O. BOX 1299, SEQUIM, WA 98382

ADD \$2 SHIPPING AND HANDLING
(3 OR MORE — WE PAY S/H)

DISSECTING YOUR ROM

The end of the disassembly!

by Jake Commander

JAKE'S DISASSEMBLY has run for more than a year now; we have four more sections at which to look. Many requests from readers to speed things up a bit have been received. OK — we give in! Here, then, is the text describing the last four sections; with it are directions to use the disassembler Jake wrote, and the program listing of the disassembler itself. Read the text, follow the instructions, and you'll have the rest of the disassembly — fast and easy!

Section Eleven

Most uses of the Print command were covered at the end of the Color Basic part of the disassembly (Part 7). One, however, was missing — probably the most useful Print command of all — Print Using. Most of this section of disassembly is involved with this extension to the Print command.

Quite a respectable piece of code it is, too. I will freely admit, it was certainly my least favorite routine to unravel. What with working out the string specifier (as in PRINT USING "##.##*\$##") and stepping through each expression in the following variable list, it takes some understanding.

Here's a quick snapshot analysis. First the specifier string is evaluated. As with any string in Basic, it can be a variable, a quoted literal, or a mixture of both. The pointer to this string is saved as it's stepped through, because it's required to drive the format routines which follow. As each format substring is analyzed, a set of flag bits is set in memory at location \$00DA. Each bit represents a particular formatting option, such as trailing sign, asterisk-fill, exponential format, etc. This

byte is built up for each numerical expression in the list.

When the end of a recognizable substring is reached, the corresponding expression in the number list is evaluated. Finally, the evaluated number is formatted into an ASCII buffer according to the requested options. The last routines in the Print Using code concern themselves with such things as dealing with leading zeroes, placing commas where appropriate, adding asterisks and/or dollar signs — and all the time keeping track of the decimal point location. There's a lot of inline code there at the end and it's not too easy to digest. Apparently, even the original programmer got self-entangled — notice the bug in evaluating the decimal exponent at locations \$9178 and \$917C. There's the explanation of why errors occur in exponents above nine: subtracting twelves is not recommended for evaluating the tens digit!

Once we're out of those dark woods, we start (at last!) with the machine code that deals with high resolution graphics.

12 — Hi Res!

High resolution graphics! It certainly took a long time to get here. To me, this is one of those most fascinating subjects, and I couldn't wait long to delve into the inner workings of this section of code. In fact, this section was disassembled and documented long before I could face routines such as RENUM and Print Using.

The code is easy to follow once you understand the many small subroutines which make up the graphics package. What tends to obfuscate the code is the different PMODEs that have to be accommodated. Things aren't too bad though; the graphic modes which are supported by Extended Color Basic all interrelate fairly well. For instance, coordinates specified for a particular graphic point can easily be transposed from one mode to another.

Last section, after the indigestible Print Using routine, the graphics code started with PSET, Preset and PPOINT. Now we'll deal with Line, PCLS, Color, PMODE,



PCLEAR, Screen, PCOPY and Get: a treasure chest of graphics code. Finally, intermingled in there somewhere is the code to deal with setting up the SAM (synchronous address multiplexer) in its dealings with the VDG (video display generator.) Although most of the graphics code is purely software oriented, this small part works right down at the hardware level. A technical reference manual is indispensable for a thorough understanding of what the code is achieving at the hardware level.

Section Thirteen

Continuing with hi-res graphics, this section starts with the Put command. Graphics saved in an array with the Get command are reinstated in video memory according to a specified option. Both the Get and Put commands are interesting to analyze. This is one of those situations where new insights into the operation of the commands can be gained by seeing what happens at the machine code level.

Following the Put command is Paint. Another interesting command, this one. It can be a little hard to follow from a raw disassembly point of view, due to the fact that the Paint routine has to keep track of where it has painted as it progresses. When it reaches any corner it has to remember to return to that point to continue from there to the border. Any corners met on the way to accomplishing that also have to be remembered. All this information goes on the stack and serves to "drive" the routine as per the shape being painted. To get the best grasp of the routine's operation, it's useful to draw a hypothetical shape and follow how the Paint routine would deal with it. This is the best way to understand any machine code routine which varies its operation according to variable parameters. And that means most machine code.

Next we encounter the Play command: sound at last! This is interesting, in that it is a "micro-interpreted" command.

The Play string has to be interpreted in much the same way as Basic itself is, and a special parse routine at \$9B98 helps achieve this.

One particularly interesting thing in the parse routine is an extremely useful feature implemented in the machine code that isn't even mentioned in my Color Computer manual. This feature lets you specify many parameters from variables. All you have to do is follow the syntax as allowed for in the string parse routine. An example to set the octave would be: `PLAY"O = X;"` where X is a variable containing the octave required. Notice the variable name must always be preceded by an equals sign and followed by a semi-colon.

It's finding goodies like this that make the chore of disassembling worthwhile. If you follow the code from \$9BBE you can decipher how this variable parameter option is allowed.

14 — The End

The Draw command starts us on the last leg of this commented disassembly. In that it's "micro-interpreted" in the same way as the Play command, Draw has a lot in common with it. Once again, the same undocumented feature exists whereby many parameters can be set by variables from within the Draw string. As long as you use the same syntax (equals sign followed by a variable name followed by a semi-colon) you can drive the command from variables outside the string.

The last command of all in the Extended Color Basic ROM is the Circle command. This is quite a speedy routine, as I found out to my chagrin. After experimenting with my own "uninterpreted" (and supposedly fast) machine code routine to draw circles, I thought my code would definitely be faster than the interpreter's.

It wasn't.

I found that I was beaten on speed but not on quality. It turns out on close scrutiny that Basic's Circle command ac-

tually draws a 64-sided polygon in close imitation of a circle, whereas my routine drew 720 dots. My circle was rounder but the interpreter's was slightly faster — an interesting trade-off between quality and speed.

Another trick the interpreter uses is that it only contains information to draw eight lines, comprising one eighth of the circle. The final circle (or arc) is built up from arcs formed by these fragments. That's eight lines each fragment which is nine pairs of start and end coordinates. These coordinates are to be found in a table from \$9E79 to \$9E9C.

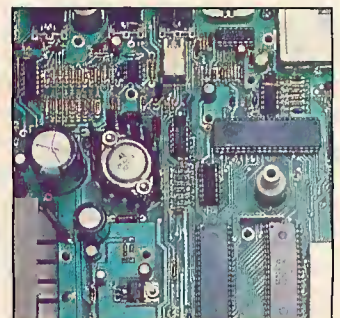
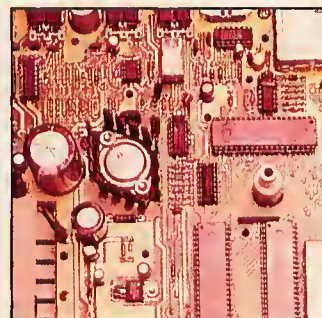
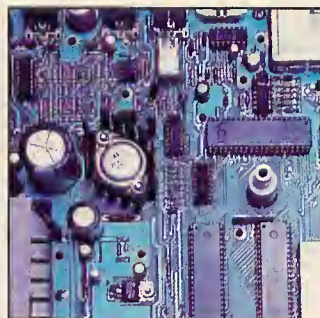
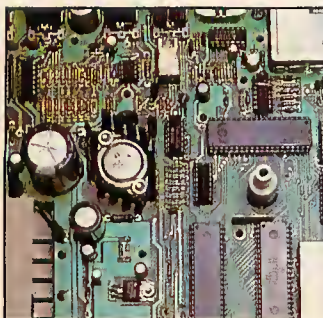
Well, I almost can't believe it, but this is the end of the journey. We've traversed the whole 16K of Extended Color Basic from start to finish and emerged unscathed. You now have the most complete User's Guide possible. If you have any questions as to the operation of any Basic command or function, just look it up in your disassembly — hopefully the answer should have been covered in enough detail that you know more than your manual will ever let on.

Most of all, I hope many readers will see how an apparently large task such as a 16K disassembly can be broken down into quite manageable parts. And once you break down the input/output drivers and interpretive code, you'll have as thorough an understanding of your machine as it's possible to get.

The Disassembler

To use the disassembler, simply Run it (RUN), and answer the first two questions with the start and end address, in hex, to disassemble. If you want the disassembly to be printed, answer the third question with Y; otherwise the listing will slowly appear on the screen. To pause you may press the shift key and the Shifted @ key simultaneously.

To pick up the disassembly where we left off at the end of part 10, use a start address of 8E37. Extended Basic ends at 9FFF. ■ ■ ■



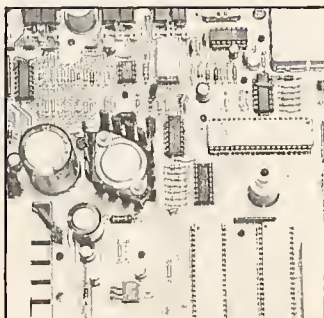
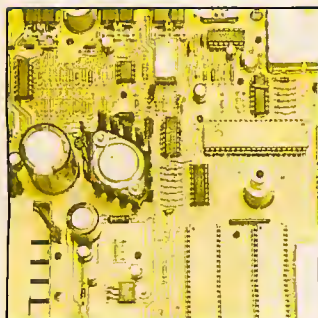
Program Listing. Disassembler

```

10 CLEAR500:CLS
20 INPUT"HEX START ADDRESS";AD$:
GOSUB990:IFT=-1THEN20ELSESA=T:OA
=T
30 INPUT"HEX END ADDRESS";AD$:GO
SUB990:IFT=-1THEN30ELSEEA=T
40 INPUT"LINE PRINT REQUIRED";Q$
:IFLEFT$(Q$,1)="Y"THENLPL=1
50 DIMO1$(3),R$(11),P$(7)
60 R$(0)="D":R$(1)="X":R$(2)="Y"
:R$(3)="U":R$(4)="S":R$(5)="PC":
R$(8)="A":R$(9)="B":R$(10)="CCR"
:R$(11)="DPR"
70 P$(0)="CCR":P$(1)="A":P$(2)="
B":P$(3)="DPR":P$(4)="X":P$(5)="
Y":P$(7)="PC"
80 O0$="NEG      COMLSR   RORASR
ASLROLDEC    INCTSTJMPCLR"
90 O1$(1)="      NOP SYNC
      LBRALBSR   DAA ORCC   NDCCS
EX EXG TFR "
100 O1$(2)="LBRALBRNLBHLBLSLBHS
LBLOLBNELBEQLBVCLBVSLBPLLBMLBGE
LBLTLBGTLBLE"
110 O1$(3)="LEAXLEAYLEASLEAUPSHS
PULSPSHUPULU   RTS ABX RTI CWAI
MUL      SWI "
120 O2$="SUBCMPSPBC333ANDBITLD ST
EORADCOR ADD333JSR22222"
130 PN=1
140 IFOA>EA THENENDELSELN$="":AD
$="":CM$="":O$="":DC=OA:GOSUB810
:LN$=HX$+" "
150 GOSUB950:B1=PK
160 IFPN=1THEN200ELSEX=B1 AND207
:IFPN=3THENIFB1=47THENOP$="SWI3"
:GOTO880ELSEIFX=131THENOP$="CMPU
":GOTO700ELSEIFX=140THENOP$="CMP
S":GOTO700ELSE870

```

Listing continues



A PORTABLE LIBRARY OF PROGRAMS FOR YOUR



The TRS-80 Model 100 makes life easier for you. You can carry it anywhere...input data anytime...store data for weeks. But what about when you want to learn how to make better use of it? Or play games? Or develop your programming skills? That's when you need a portable encyclopedia of ideas...that's when you need THE TRS-80 MODEL 100 IDEABOOK!

Packed with over 50 tested, ready-to-run programs in business, science and mathematics, THE TRS-80 MODEL 100 IDEABOOK is your programming guide to the best ways you can use your portable computer!

Ideal for TRS-80 Model 100 and NEC PC-8201 users, there are more than 50 listings in:

- Drill and Practice
- Problem Solving
- Sets and Repetitive Trials
- Convergence and Recursion
- Compounding
- Probability
- Geometry and Calculus
- Science

And Games, Simulations and more!

Edited by David H. Ahl, Founder of CREATIVE COMPUTING magazine.
Only \$8.95! Order your copy today!

For faster delivery, PHONE TOLL FREE
9 am-5 pm EST: 1-800-631-8112
(In NJ only: 201-540-0445)

Also available at your local bookstore or computer store.

CREATIVE COMPUTING PRESS

Dept. NL6H, 39 East Hanover Avenue
Morris Plains, NJ 07950

Please send me _____ copies of THE TRS-80 MODEL 100 IDEABOOK at \$8.95* plus \$2.00 postage and handling (\$5.00 outside USA) each. #4A

Payment Enclosed \$ _____. *Residents of CA, NJ and NY State add applicable sales tax.

Charge My: ☐ American Express
☐ MasterCard ☐ Visa

Card No. _____

Exp. Date _____

Mr./Mrs./Ms. _____
print full name

Address _____

City/State/Zip _____

☐ Please send free catalog.

PRO-COLOR-SERIES

THE BEST JUST GOT BETTER

PRO-COLOR-FILE *ENHANCED* \$79.95

PRO-COLOR-FILE has become one of the most respected database programs ever developed for the Color Computer. Whether it's for home or business, PRO-COLOR-FILE lets you design your own sophisticated database tailored to your needs.

60 DATA FIELDS available for each record to store information
1020 BYTES for each record can be used if needed
1 - 4 DISK DRIVES can be used to maximize storage capacity
4 COLOR DATA ENTRY screens can be custom designed
28 MATH EQUATIONS can be setup to perform calculations
POST ACCOUNTS routine performs calculations on an entire file
DUPLICATE RECORDS or FIELDS from previous entries
SORT ENTIRE FILE on 3 fields at one time
SORT ANY SIZE FILE whether it's 200 or 2000 records
SELECT SUB-SETS of file for sorting or reporting
SCAN FILES alphabetical by any field
SUMMARIZE FILES to find totals, averages, low and hi values
8 REPORT FORMATS for obtaining hard or soft copy reports
6 LABEL FORMATS for 1 to 10 across labels & 1 to 30 lines/label
PASSWORD PROTECTION for limited access to data and reports

PRO-COLOR-FILE was so well received that over 70% of the owners of the original version ordered the PRO-COLOR-FILE *ENHANCED* upgrade in the first 2 weeks of its introduction. Find out for yourself why people in almost every state, Canada, South America, and even the Far East and Europe have turned to PRO-COLOR-FILE *ENHANCED* for their information management needs.

PRO-COLOR-FORMS \$39.95

This application software allows data which is stored using PRO-COLOR-FILE to be printed anywhere on a full sheet of paper. Use it to print data on pre-printed forms or use it to design your own forms. Use PRO-COLOR-FORMS to create letters for mass mail-outs that have a personal touch by being able to insert names and addresses anywhere within the letter. Design and redesign up to 6 forms with user defined parameters such as printer width and lines per page. Supports embedded printer control codes from ASCII 0 to 31.

PRO-COLOR-DIR \$24.95

Tired of not knowing which diskette has that program you're looking for? PRO-COLOR-DIRectory will create a data file of all your disk directories that can be used by PRO-COLOR-FILE to generate alphabetized reports for easy reference. PRO-COLOR-DIR will store a diskette ID name, filename, extension, file type, number of grants allocated, number of sectors allocated, number of sectors used, machine language addresses and length, date it was created and date it was updated. 1000 entries are easily stored on one diskette!

All programs require a 32k Disk with at least one disk drive. PRO-COLOR-FORMS and PRO-COLOR-DIR require PRO-COLOR-FILE to be used. All programs (c) 1983 by Derringer Software, Inc.

See your local dealer or send check or money order to:
DERRINGER SOFTWARE, INC., P.O. Box 5300, Florence,
South Carolina 29502. Visa/MC customers call (803)665-5676
Add \$3.50 S&H - Available on AMDISK (Add \$5.00).
S.C. residents add required sales tax.

```
170 IFB1=63THENOP$="SWI2":GOTO88
0ELSEIFB1>32ANDB1<48THEN220
180 IFB1=143ORB1=207THEN870ELSEI
FX=131THENOP$="CMPD"ELSEIFX=140T
HENOP$="CMPY"ELSEIFX=142THENOP$=
"LDY"ELSEIFX=143THENOP$="STY"ELS
EIFX=206THENOP$="LDS"ELSEIFX=207
THENOP$="STS"ELSE870
190 GOTO700
200 IFB1>127THEN650
210 IFB1=16ORB1=17THENPN=B1-14:G
OTO150
220 LN$=LN$+" ":IFB1<16ORB1>63TH
ENOP$=MID$(O0$,(B1 AND15)*3+1,3)
ELSEX=(B1 AND48)/16:OP$=MID$(O1$
(X),(B1 AND15)*4+1,4)
230 IFB1>127THEN650ELSEIFB1>63TH
EN610ELSEIFB1>47THEN600ELSEIFB1>
31THEN310ELSEIFB1>15THEN260
240 IFOP$=" "THEN870
250 GOSUB940:GOSUB750:AD$="<" +HX
$:GOTO880
260 ONB1-17GOTO880,880,870,870,3
30,330,870,880,270,870,270,880,3
60,360
270 IFB1=28THENOP$="ANDCC"
280 GOSUB940:GOTO300
290 GOSUB920:GOSUB800
300 GOSUB750:AD$="#" +HX$:GOTO880
310 IFPN=2THEN330ELSEOP$=RIGHT$(
OP$,3):GOSUB940:GOSUB1020
320 X=ABS(B2):GOSUB790:GOSUB750:
AD$=O$+HX$:GOSUB810:CM$=HX$:GOTO
880
330 GOSUB800:GOSUB1030
340 DC=ABS(B2):GOSUB810:GOSUB760
:AD$=O$+HX$:DC=OA+B2
350 GOSUB810:CM$=HX$:GOTO880
360 GOSUB970:GOTO880
370 GOSUB940:B1=PK:R=(PK AND96)/
32+1:IFPK>127THEN390ELSEX=PK AND
31:X=X+(X>15)*32:IFX<0THENO$="-
380 X=ABS(X):GOSUB790:GOSUB750:A
D$=O$+HX$+" "+R$(R):GOTO880
390 T=PK AND15:IFT=7ORT=10ORT=14
THEN870ELSEIFT=12ORT=13THENR=5
400 ONT+1GOTO410,420,430,440,450
,460,470,20,480,490,20,510,520,5
30,20,540
410 AD$=" "+R$(R)+"+":GOTO880
420 AD$=" "+R$(R)+"+":GOTO550
430 AD$=" "-R$(R):GOTO880
440 AD$=" --"+R$(R):GOTO550
450 AD$=" "+R$(R):GOTO550
460 AD$="B "+R$(R):GOTO550
470 AD$="A "+R$(R):GOTO550
```



```

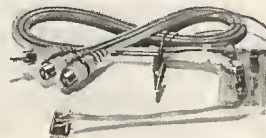
480 GOSUB950:GOSUB1020:X=ABS(B2)
:GOSUB790:GOTO500
490 GOSUB800:GOSUB1030:DC=ABS(B2)
:GOSUB810
500 GOSUB750:AD$=O$+HX$+"", "+R$(R)
):GOTO550
510 AD$="D", "+R$(R):GOTO550
520 R=5:GOTO480
530 R=5:GOTO490
540 GOSUB800:AD$="[ "+HX$+" ]":GOT
O880
550 IF(B1 AND16)=0THEN880ELSEAD$
="[ "+AD$+" ]":GOTO880
560 IFRIGHT$(OP$,1)="S"THENP$(6)
="U"ELSEP$(6)="S"
570 GOSUB940:FOR Y=0TO7:PK=INT(PK
)/2:IFPK=INT(PK)THENNEXTELSEAD$=
AD$+P$(Y)+"", ":NEXT
580 IFLEN(AD$)<>0THENAD$=LEFT$(A
D$,LEN(AD$)-1)
590 GOTO880
600 IFB1<52THEN370ELSEIFB1<56THE
N560ELSEONB1-55GOTO870,880,880,8
80,280,880,870,880
610 X=(B1 AND48)/16:IFOP$=" " O
ROP$="JMP"ANDX<2THEN870ELSEONX+1
GOTO630,640,370
620 GOSUB920:GOSUB800:GOSUB760:A
D$=HX$:GOTO880
630 OP$=OP$+"A":GOTO880
640 OP$=OP$+"B":GOTO880
650 IFB1=135ORB1=143ORB1=199ORB1
=205ORB1=207THEN870ELSEX=B1 AND1
43-128:OP$=MID$(O2$,X*3+1,3):IFR
IGHT$(OP$,1)=" " THENOP$=LEFT$(OP
$,2)
660 X=B1 AND15:IFX<12ANDX<>3THEN
IFB1>191THENOP$=OP$+"B":GOTO700E
LSEOP$=OP$+"A":GOTO700
670 IFB1>191THEN690ELSEIFX=3THEN
OP$="SUBD"ELSEIFX=12THENOP$="CMP
X"ELSEIFX=14THENOP$="LDX"ELSEIFX
=15THENOP$="STX"ELSEIFB1=141THEN
OP$="BSR":GOTO310
680 GOTO700
690 IFX=3THENOP$="ADDD"ELSEIFX=1
2THENOP$="LDD"ELSEIFX=13THENOP$=
"STD"ELSEIFX=14THENOP$="LDU"ELSE
IFX=15THENOP$="STU"
700 X=(PK AND48)/16:ON4-X GOTO62
0,370,250
710 X=PK AND15:IFX=3ORX>11THEN29
0ELSE280
720 LN$=LN$+HX$:IFB1<63THEN730EL
SEIFB1=63THENOP$="SWI2"ELSEX=B1A
ND79:IFX=3THENOP$="CMPD"ELSEIFX=

```

MORETON BAY SOFTWARE

DOUBLE DRIVER

The BEST monitor driver available, unlike some monitor drivers the Double Driver provides TRUE monochrome and color composite output. Audio Output. Solderless installation. \$24.95



RESET YOUR COMPUTER

A REAL Improvement

Move the power switch and reset where they belong. An LED power on light too! High quality parts. Totally solderless kit.

CoCo I \$24.95

CoCo II \$27.95



64K UPGRADES

Instantly access 64K via M/L Totally solderless kit to upgrade E Boards. Kit includes eight 4164 prime chips and chips U29 and U11 already soldered. E Board Kit \$69.95

Color Computer II kit requires soldering. \$64.95



GRAPHICOM

The Ultimate Graphic Utility

You must see this program to believe it! Create pictures and text on the same screen. Now you can create pictures as good as any graphic you have seen on the color computer. Write graphic adventures or educational programs. Requires 64K EXB, Disk Drive and Joy Sticks \$29.95

MORETON BAY SOFTWARE

A Division of Moreton Bay Laboratory



316 CASTILLO STREET
SANTA BARBARA,
CALIFORNIA 93101
(805) 962-3127

Circle No. 43 on Reader Service Card

Ordering information

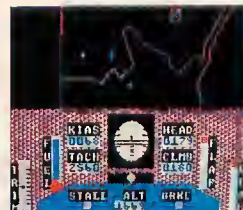
Add \$2.00 shipping and handling per order. We ship within 24 hours on receipt of order. Blue Label Service available. California residents add 6% sales tax.

MasterCard and Visa.

New From Tom Mix...

Worlds of FLIGHT

Not A Game — A Very Realistic Flight Simulation



WORLDS OF FLIGHT (WOF) is a "view" oriented flight simulation for the TRS-80 Color Computer, written entirely in Machine Language. "View" oriented means that the pilot may determine his or her position by actually viewing the surrounding landmarks as opposed to using instruments which sense navigational references. This is a major departure from "instrument only" simulations which can be achieved through BASIC programs. Most instrument maneuvers and procedures may be practiced. The craft is a light-weight, single-engine airplane with low wings. A nose wheel which is both steerable and retractable is also modeled. Some aerobatics are possible including sustained inverted flight, aileron rolls, spins and stalls.



The Experts Say:

C.L. — "As a pilot I found "Flight" to be an outstanding simulation.

M.H. — "No one has created a more realistic flight simulator for the Color Computer."

D. HOOPER, pilot for major airline — "An outstanding flying experience. Very realistic."

JOYSTICKS REQUIRED
32K MACHINE LANGUAGE
TAPE \$29.95 DISK \$32.95



TOM MIX SOFTWARE

4285 BRADFORD N.E.
GRAND RAPIDS, MI 49506

•ADD \$1.50 POSTAGE & HANDLING•TOP ROYALTIES PAID•
•MICHIGAN RESIDENTS ADD 4% SALES TAX•
LOOKING FOR NEW SOFTWARE



ARCADE ACTION GAMES

VISA

TO ORDER CALL 616/957-0444


```

12THENOP$="CMPY"ELSEIFX=14THENOP
$="LDY"ELSEIFX=15THENOP$="STY"EL
SEIFX=78THENOP$="LDS"ELSEIFX=79T
HENOP$="STS"ELSE880
730 IFX<17ORX>47ORX=52ORX=53THEN
OP$="":GOTO880ELSEOP$="L"+OP$
740 LN$=LN$+HX$:IFB1=63THENOP$="
SWI3"ELSEX=B1AND79:IFX=3THENOP$=
"CMPU"ELSEIFX=12THENOP$="CMPS"EL
SE880
750 IFLEN(HX$)=2THENIFHX$<"0A"TH
EN780ELSE770
760 IFHX$<"000A"THEN780
770 HX$="$"+HX$:RETURN
780 HX$=RIGHT$(HX$,1):RETURN
790 HX$="":GOTO830
800 GOSUB950:B2=PK:GOSUB950:DC=B
2*256+PK
810 HX$="":HB=INT(DC/256):LB=DC-
HB*256
820 X=HB:GOSUB830:X=LB
830 Y=INT(X/16):IFY>9THENY=Y+7
840 HX$=HX$+CHR$(Y+48)
850 X=X-INT(X/16)*16:IFX>9THENX=
X+7
860 HX$=HX$+CHR$(X+48):RETURN
870 OP$="":AD$=""
880 LN$=LN$+STRING$(15-LEN(LN$),
32)+OP$
890 LN$=LN$+STRING$(20-LEN(LN$),
32)+AD$
900 IFCM$<>" "THENLN$=LN$+STRING$
(27-LEN(LN$),32)+CM$
910 IFLP=1THENPRINT#-2,LN$:GOTO1
30ELSEPRINTLN$:GOTO130
920 L=LEN(LN$):IFL<9THENL=8
930 LN$=LN$+STRING$(L-LEN(LN$),3
2):RETURN
940 GOSUB920
950 GOSUB960:X=PK:GOSUB790:LN$=L
N$+HX$:RETURN
960 PK=PEEK(OA):OA=OA+1:RETURN
970 GOSUB940:X=(PK AND240)/16:GO
SUB980:AD$=AD$+",":X=PK AND15
980 IFX>11THEN870ELSEIFR$(X)=" "T
HEN870ELSEAD$=AD$+R$(X):RETURN
990 T=0:FORX=1TOLEN(AD$):Y=ASC(M
ID$(AD$,X,1)):IFY<48ORY>70OR(Y<6
5ANDY>57)THENT=-1:RETURN
1000 Y=Y-48:IFY>9THENY=Y-7
1010 T=T*16+Y:NEXT:RETURN
1020 B2=PK+(PK>127)*256:DC=OA+B2
:GOTO1040
1030 B2=DC+(DC>32767)*65536
1040 IFB2<0THENO$="-":RETURNELSE
RETURN

```

What Does Dugger's Growing Systems Grow?

We grow C Compilers (\$120 value)

generate fast, efficient code
longs, floats, most operators

FLEX* \$75.00

new OS-9* \$59.95

COCO DOS \$49.95

We grow Relocatable Macro Assemblers

(\$150 value)

Assembler, linker, library builder
symbols up to 32 characters

"fortran-like" common

FLEX* \$75.00

new OS-9* \$75.00

COCO DOS \$49.95

We grow Orchids

Odontoglossums

write for catalog and price list

We grow HI RES OS-9 "Windows"

52 x 24 hi-res display

new cursor control

multi-window displaying

OS-9* \$34.95

We grow Orchids

intergeneric hybrids

write for catalog and price list

We grow OS-9 Experts

Over 6 years experience with OS-9

Used in development of major project

Experts in both levels 1 and 2

Quality

quality at an affordable price

all products tested and proven

Solid Authorship Royalties

royalties up to 20% of selling price

Only quality products accepted


ORDER NOW! YOU OWE IT TO YOURSELF

All orders add \$3.00 for shipping

VISA and MC welcomed

Foreign orders add 15%

California orders add 6%

For more information write  or call:

DUGGER'S GROWING SYSTEMS

Post Office Box 305

Solana Beach, Calif. 92075

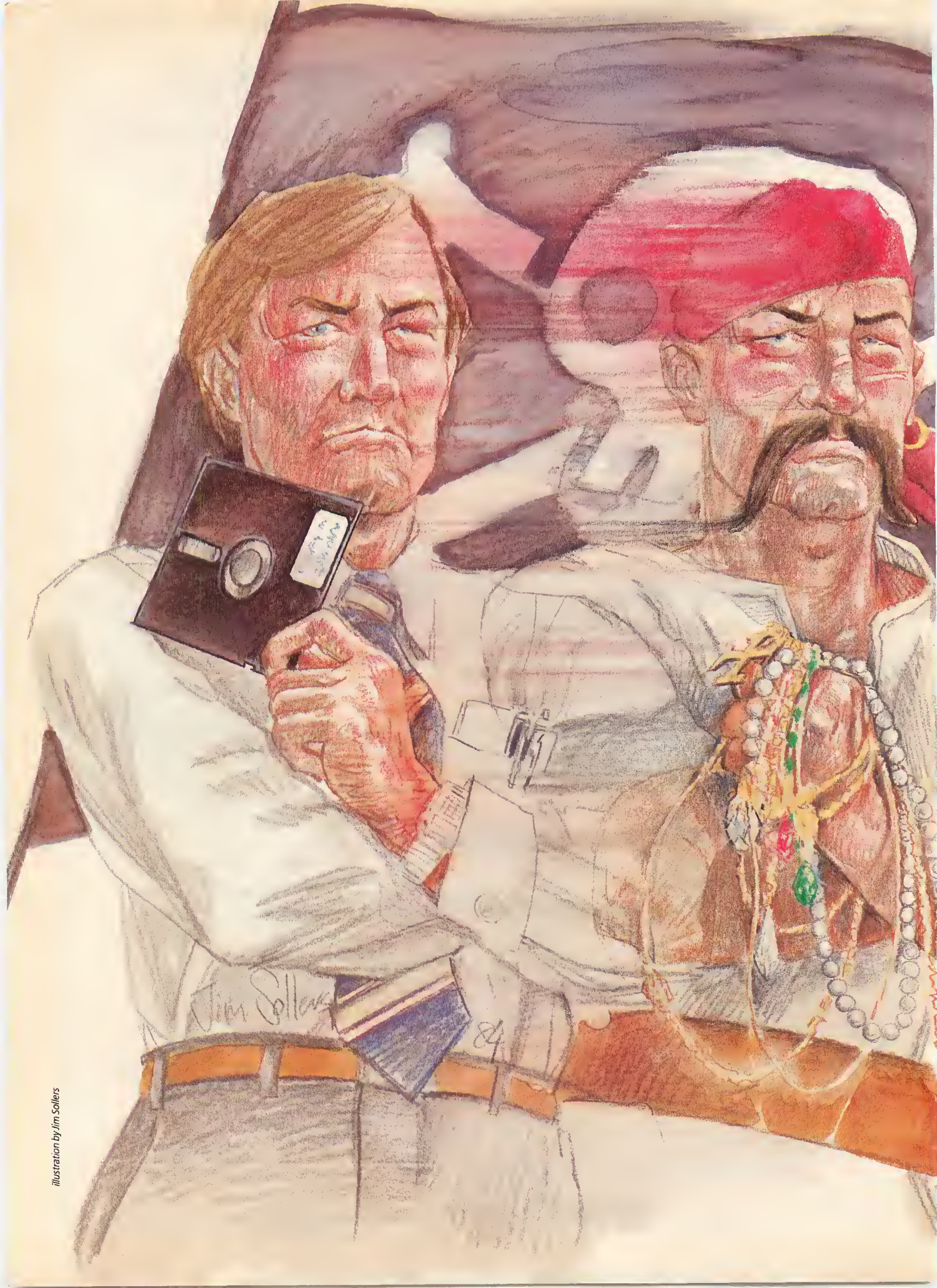
(619) 755-4373

Technical information 6 am to 8 am PDT only

Dealer inquiries welcome

*Flex—trademark of TSC, OS-9 trademark of Microware

Circle No. 41 on Reader Service Card





Color Computing for Kids

We take a look at a serious subject — software piracy.

by Jean Plessner

RATHER THAN PRESENT a programming lesson this month, I've decided to call your attention to a serious problem that affects all computer software users. *Software piracy* is the illegal copying and sharing of copyrighted software; it affects everyone who buys or sells computer software.

Software is the term used for programs available on cassette tapes, ROM-paks, disks, or in magazines. *Piracy* is a term used to describe the act of theft, or stealing. *Copyrighted* software means someone has legally protected the software against copying by anyone, other than for limited reproduction for such purposes as critical commentary (in reviews), news reporting, and educational use, presumably by teachers in a classroom setting.

I've chosen July to talk about software piracy because it's the anniversary of Independence Day. It's a time that all of us feel especially proud of our country and the *integrity* (honesty) that has been the backbone of America. On July 4 we look forward to celebrations that may include picnics, parades, contests, games, lots of good food and, almost certainly, fireworks. The booming, blasting explosions of the fireworks are a reminder of America's protection of freedom. The Declaration of Independence declared our freedom from British rule, and America later adopted the Constitution and Bill of

Rights to continue to protect the rights and freedom of every American. Software piracy is an insult to our integrity and a violation of human rights.

As responsible citizens, we observe laws and work together to protect the rights and property of all. We enjoy our freedoms, sometimes even take them for granted, but because we have so many rights and liberties we often don't know when a seemingly harmless action is really a violation of someone else's rights. Software piracy can be such an act, and all of us, working together, can make a difference by protecting the rights of others and ultimately our own freedoms.

The Pirate's Tale

We picture pirates from the movies we've seen and books we've enjoyed. They wear large hats or turbans, shiny boots (or boot if it's a peg-legged pirate), gold earrings pierce their ears, and a sword or dagger is never far from hand. Pirates sail the seas in search of treasure and adventure. They drink rum and sing humorous drunken songs. They seem to always be having a great time and we can easily get caught up in their glorified adventures.

But, the truth is, traditional pirates were sea robbers. They were thieves who thrived on stealing property belonging to others. They stole and shared goods that

the rightful owners depended on for their livelihood. Pirates' treasures were other people's losses, and sometimes these thefts destroyed a person's ability to live without help from neighbors.



tion and a fee for registration to the United States Copyright Office in Washington, D.C. Another way is to put the words "Copyright 19— by XXX" somewhere on the work or package. These words are often replaced by the copyright symbol (©) followed by the date. See if you can find a copyright notice on a piece of software you purchased.

A copyright legally protects the right that authors and artists have to protect their work. A copyrighted work cannot lawfully be copied by anyone, without written permission from the copyright owner, for selling, renting, leasing, or lending. You can, however, make a copy for your own personal use of something you've purchased. Video and audio tape recorders for example, were created for your convenience and recording on either

Copyright 1984 John Smith
Copyright 1984 John Smith, All Rights Reserved
Copr. 1984 John Smith
c 1984 John Smith
© 1984 Company Name

Figure 1. Examples of copyright notices or marks that may appear on software.

Entire contents Copyright © 1984 Ziff-Davis Publishing Company. All rights reserved; reproduction in whole or in part without permission is prohibited.

*Figure 2. This is a copy of the copyright notice that appears in **The Color Computer Magazine**, protecting all the articles and programs in it from illegal copying. You will find a similar notice in most magazines.*

Pirates may seem unreal, tucked away in literature or movie reels, and hardly able to affect our daily lives. There is a modern-day pirate, however, that is just as menacing. Software pirates copy, with intent to share and sometimes sell, programs that have been copyrighted by others. This means they are stealing material that belongs to someone else as well as violating the rights of another. Now you know why the term *pirate* is used to describe software thieves.

What Is a Copyright?

Copyright technically means, "right to copy." When a person creates or writes something for public use or enjoyment, the person can protect his or her right to own and control it. This is done in several ways. A common way is by sending copies, or pictures, of the work with an applica-

device is not piracy if you do not record from someone else's copy or sell, rent, lease, or loan your copy to anyone.

Copyrighted material is printed with a copyright symbol or statement. Of course, a *copy* of a copyrighted work will probably not have this information — but the work is still protected, and must be considered the same as the original.

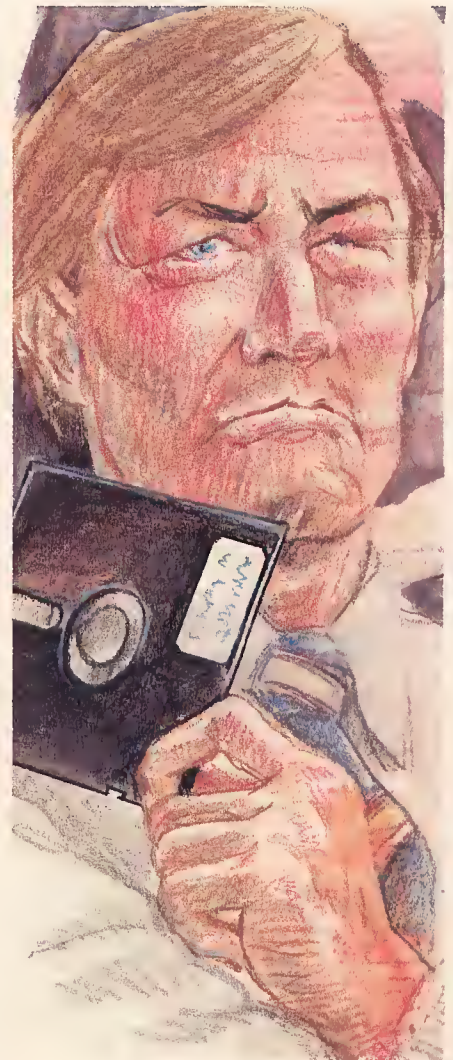
Why Copyright?

Computer programmers, like writers and artists, use their knowledge and talent to make significant contributions to society. Their programs help solve problems, save time, help us become more efficient and organized, as well as teach and entertain us.

Computer software has perhaps caused more significant changes in our society than anything since paper and pencil.

We want it, need it, and continually demand more. With the help of computers and expert software, businesses save money and time, schools save money and can teach more effectively, hospitals and other public service facilities save money and provide more efficient services, and many, many other organizations benefit in time- and money-saving ways. Let's not forget the millions of personal computers found in homes throughout the world creating a need for money-saving, time-saving, creative, challenging, and entertaining software.

Did you notice how many times I used the word *money* when I talked about software? The word occurred often because software is a serious business made up of many individual businesses, both small and large. That means there are many, many people who work in the



software industry, just as they do in any other industry, and each of these people need to earn salaries that support themselves and their families. All the way from the computer programmer to the software packager, there are families like

OS-9[®]

SOLUTIONS

for your

CoCo!



For more information or to place an order, contact:

Dept. CC 10

The JBM Group, Inc.
Continental Business Center
Front & Ford Streets
Bridgeport, PA USA 19405
TEL: 215-337-3138
TWX: 510-660-3999

the **JBM**
group

VISA/MASTERCARD accepted. PA res. add 6% sales tax.
US orders, add \$5.00 postage and handling.

* OS9 is a registered trademark of Microware Corp.

- powerful problem solvers
- mainframe computing for your micro
- total systems support

ANNOUNCING creative computing's **1984 BUYER'S GUIDE**

TO PERSONAL
COMPUTERS &
PERIPHERALS



Advice you can trust on selecting personal com- puters, peripherals and electronic games

Unless you have the memory of a computer there's no way you can keep track of all the games, programs and peripherals available for your computer. And even if you could, you'd still have a problem figuring out what's best for your needs and how to get the most for your money.

That's why you need the *1984 Buyer's Guide to Personal Computers & Peripherals*. It's a comprehensive collection of product reviews and consumer-oriented shopping advice put together by the experts at *Creative Computing* magazine.

You'll get a rundown of what's new on the market. Analysis of new product performance, reliability, operation, applications, cost—even what kind of repair service you can expect. Easy-to-understand comparisons between different models. Tips on bugs and design problems. Plus "inside" information you won't get from manuals or salespeople.

Don't buy until you've consulted the *1984 Buyer's Guide to Personal Computers & Peripherals*! Order your copy today.

Send to: NV1C
Creative Computing Buyer's Guide
CN 1914, Morristown, NJ 07960

YES! Please rush me *Creative Computing's 1984 Buyer's Guide to Personal Computers & Peripherals*. Enclosed is my check or money order for \$3.95 plus \$1 for postage and handling.

Mr./Mrs./Ms. _____
(please print)

Address _____

City _____

State _____ Zip _____

Please make check payable to Creative Computing Buyer's Guide. CA, NJ and NY State residents please add applicable sales tax. Price outside U.S.A. is \$6.

yours who depend on the income received from the sale of copyrighted software.

When a business successfully sells a product they are able to produce more of the product. This act alone can support many other businesses and many other people. When businesses and individuals earn money they pay taxes on their earnings or profits, and this keeps our government functioning and working for us. If a business fails, everyone connected with the business is affected. The materials and products it once needed are no longer in demand; all the people who worked to supply the products or services needed by the business are now out of work; and the state, local and federal governments experience a loss in tax revenue. Think of dominoes when they are set up in a row: knock over the first and one after another they all fall down. This can be the case in business when companies fail.

Copyrights are just one of the safeguards a software business takes in an effort to protect their investments and their future. Another safeguard is a special code included in a program so that a listing cannot easily be copied. Both safeguards are used to keep the consumer from violating the copyright and, ultimately, jeopardizing the future of the software business when one copy can become ten, fifty, or even hundreds of copies for each one sold.

When a pirate breaks a protection code and places a game or other piece of software on a BBS (computer Bulletin Board Service) for users to copy, it hurts everyone. Software businesses are reluctant to buy software licenses for the arcade games you and I most want to own for our Color Computers and to spend the large amounts of money required to reproduce such games. Who suffers most in the end? You and I. Why? Because software pirates steal more than programs. They rob us all of our rights to free enterprise and total enjoyment of our investments—business or personal.

You Can Make A Difference

We all like to get something for nothing. *Free* is like a magic word that attracts people to things they wouldn't normally be interested in, but free isn't usually free. Someone is paying somewhere along the line, and it's usually you. The price of related items may become higher or quality may suffer, and both can be the case where "free" means "pirated software."

If software piracy isn't eliminated you will eventually pay much more for soft-

ware and have much less available. There will be fewer people willing to invest their time and money in something so risky, and you and I will be left with computers that are no longer serving our needs and expectations. But we can all help by understanding and approaching piracy maturely and responsibly.

It's very hard to turn something down that you can get for nothing—especially something you want and something a lot of other people are taking. It may even seem really dumb to then turn around and purchase the same thing you could have had for free. But, when you remember that someone's job or security may be affected by your action, it seems even more dumb not to. I know you would see my point even more clearly if we were talking about the security or future career of someone you care about, so if it helps, think of it in just that way. We may even be talking about *your* future. What career do you hope to work in some day? Will computers be involved? My guess is probably yes and I also wonder if copyright violators won't have an effect on you too.

Regardless of whether we have personal reasons for wanting protection or copyright laws, our main concern should simply be in the protection of our freedoms as Americans. We as individuals have that responsibility, and creating and following our consciences is perhaps the best protection for all our rights. So, the next time you're tempted with pirated software, listen to your conscience—it's wrong and it can hurt others. Spread the word. Please.

Then Why Does It Cost So Much?

Computer software is not really something you can hold in your hand and immediately decide its value. You're not actually buying a cassette tape or a disk, but rather the program recorded on it, so the price of each software package may vary greatly. The price is determined by many factors, as we'll see in our next article. I've visited a software business and I'll share what I've learned with you as we follow a piece of software from the programmer's mind to the store's display rack.

We'll look at the roles of the many people involved and at the costs of producing quality software. I learned a lot of things that give software a value beyond the store price tag, and I'm anxious to share them with you.

Join me as I take you where no software pirate has dared to go and innocently continue to violate the rights of the software industry. ■ ■ ■

DON'T LET YOUR COLOR FADE AWAY!

THE **Color Computer** MAGAZINE



Subscribe to The COLOR COMPUTER Magazine and add "Living Color" to your TRS-80 Color Computer. Don't wait any longer! Subscribe today and save up to 41%!

YES!

I want to subscribe to
The COLOR COMPUTER
MAGAZINE for:

- ☐ One year for \$17.97. I SAVE 28%!
- ☐ Two years for \$31.97. I SAVE 36%!
- ☐ Three years for \$43.97. I SAVE 41%!

Savings based on full one-year (12 issues) subscription price of \$24.97.

Mr./Mrs./Ms. _____ please print name in full TR 4S077

Company _____

Address _____

City _____ State _____ Zip _____

Check one: ☐ Payment enclosed ☐ Bill me later

Charge my: ☐ American Express ☐ Visa ☐ MasterCard

Card No. _____ Exp. Date _____

Please allow 30 to 60 days for delivery of first issue.
Add \$8 per year for Canada and all other foreign countries.



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 66 BOULDER, COLORADO

POSTAGE WILL BE PAID BY ADDRESSEE



P.O. BOX 2597
Boulder, Colorado 80321



IS YOUR COLOR FADING AWAY?

ADD MORE COLOR TO YOUR COLOR COMPUTER WITH



Have you been looking for the magazine to make your Color Computer more colorful... versatile and fun?! It's here... in full color... with bright new ideas, programs and games—The COLOR COMPUTER Magazine, the magazine for TRS-80 Color Computer users and owners! Every issue of The COLOR COMPUTER Magazine brings you a new “users manual” and program guide each month! You'll get:

- Programs for home and business... adults and kids!
- Software and Hardware reviews on the best (and least expensive) ways to upgrade your system!
- Games of skill, chance and luck!
- Sound and music synthesizing tips!

- How-to articles for the “Do-It-Yourselfer”!

You'll also find current listings of new products, directories and compatible peripherals for your Color Computer!

ADD “LIVING COLOR” TO YOUR HOME COMPUTER AND SAVE UP TO 41% WITH The COLOR COMPUTER Magazine!

YES!



I want to make my Color Computer more versatile! Please enter my subscription to The COLOR COMPUTER Magazine for:

- ☐ One year for \$17.97. I SAVE 28%!
- ☐ Two years for \$31.97. I SAVE 36%!
- ☐ Three years for \$43.97. I SAVE 41%!

Savings based on full one-year (12-issue) subscription price of \$24.97.

Mr/Mrs/Ms _____ please print name in full

Company _____ TR4S077

Address _____

City _____ State _____ Zip _____

Check one: ☐ Payment enclosed ☐ Bill me later

Charge my: ☐ American Express ☐ Visa ☐ MasterCard

Card No. _____ Exp. Date _____

Please allow 30 to 60 days for delivery of first issue.
Add \$8 per year for Canada and all other foreign countries.

THE COLOR COMPUTER MAGAZINE—P.O. Box 2597—Boulder, CO 80322

*"Quality... works well... fine product... great feel... pleased with it...
excellent piece of hardware... it's outstanding... feel and appearance
are great... love everything"*



Macrotron** Proudly Introduces Our New "Premium" Keyboard—The Best For Your Color Computer

The Best Keyboard

All the features of our popular PROFESSIONAL KEYBOARD:
No gluing, soldering, or cutting—plugs right in.
High quality construction assures years of trouble-free operation.

PLUS

Attractive low profile
Extended Radio Shack layout
Silk-Smooth feel

The Best Software—uses ALPS keyswitches

Our Versakey Software enhances
the keyboard's utility:

- * Auto-repeat, n-key rollover and type-ahead
- * F-1 becomes DEFINE,
F-4 becomes CTRL
- * May define up to 128 keys
(including SHIFT, CTRL, and
SHIFT-CTRL combinations) as
strings of up to 80 characters each.
- * Supplied on cassette, may be copied to disk.

The Best Manual

- * Very complete documentation (including
plenty of figures to illustrate the keyboard's
installation and versatility).

"Have Josie ship yours today!"

The Best Prices

The "Premium" Keyboard (including software).....	\$79.95
The "Professional" Keyboard (including software).....	\$59.95
The "Versakey Software".....	\$ 9.95

Please specify your computer's PC board type if known. Otherwise, specify the complete catalog
number and serial number.

**Micronix Systems is a subdivision of Macrotron Systems Corporation.

MACROTRON SYSTEMS CORP.
8147 Delmar Blvd. St. Louis, MO 63130
(314) 721-3356
Telex 704523 Answer Back-MACANITA STL UD
DEALER INQUIRIES INVITED

Terms: Prepaid check or money order, Mastercard or Visa.
Shipping Charges: U.S. FREE, Canada \$2.00, COD \$5.00 (No COD's to Canada).

Circle No. 149 on Reader Service Card

Summer Programming Project



Illustration by Rod McCormick

The Very Last Winner!

TRAP 'EM, BY MATTHEW Cimbala, is the Second Runner Up in the assembly language category of The Summer Programming Project. Trap 'Em takes a quick eye, a quick hand, and enough bravado to try the impossible, in order to win. High scores are not made by the prudent among us.

To load Trap 'Em, first enter the Basic Loader (Listing 1) and CSAVE it. Then type RUN. If you get an ?FC ERROR message the first time you do this, don't panic — graphics memory where the game is placed simply wasn't set. Just enter RUN again. If there are any errors, the loader will now inform you what lines they are in. Make your corrections — you'll know they are all fixed when the ARE YOU READY? prompt appears when you run the loader. Press Break and save the corrected Basic loader (with CSAVE), and then save the game itself with: CSAVE "TRAPEM", 2048, 5407, 2048. To run the game from tape: CLOADM:EXEC and press Enter. Alternatively, you can press Y in response to the

original READY? prompt to play immediately from the loader (warning — the Basic loader is lost when you use this method and you won't be able to play again without re-entering the loader by hand. The first method is preferable).

The Game

The game starts with four balls bouncing inside a large green box. Using the left joystick, you move a marker along the edges of the box. The object of the game is to cause each ball to bounce at least 100 times in the first 100 seconds of play. You do this by building new walls off the original box, into the play area: point the joystick in the direction you wish to create a wall, and hold the fire button down to move the marker in that direction. The marker will draw a new wall (in blue) in that direction until you release the fire button or hit a green wall. Hitting a green wall makes your new, blue wall permanent, and it turns green.

T
R
A
P
'
E
M

Releasing the fire button doesn't make a wall permanent! Trapping balls inside smaller boxes makes them bounce faster, adding to your score. There is a catch, however: if a ball bounces against a blue (incomplete) wall, you lose the wall and

your marker (you have only three markers per game).

A timer keeps track of seconds ticking by. If the balls have bounced at least 100 times in the 100 seconds, you are presented with a new, empty box, and one

ball is added. This may continue until you have a total of 10 balls in the box.

Pressing Break at any time clears the score and starts the game over with four balls.

Good luck!

■ ■ ■

Program Listing 1. Basic Loader Trap 'Em



16K
Color
Basic

```
0 PCLEAR4: CLS: PRINT@315,"LOADI
NG TRAP'EM"
2 LN=100: FOR P= 2048 TO 5407 ST
EP 32: PRINT@205,LN
3 CK=0: FOR AD= P TO P+31
4 READ B: CK=CK+B: IF (255 AND B
)<>B THEN PRINT" DATA ERROR IN L
INE"LN: PRINT" BYTE VALUE"B"NOT
ALLOWED": STOP
5 POKE AD,B: NEXT AD: READ B: IF
CK<>B THEN PRINT" CHECKSUM ERRO
R IN LINE"LN: PRINT" READ:"B" CA
LC'D:"CK: STOP
6 IF P= 4096 THEN P=P+992: LN=LN
+310
7 LN=LN+10: NEXT P: PRINT@386,"R
EADY FOR TRAP'EM? (Y/BREAK)"
8 IF INKEY$<>"Y" THEN 8 ELSE EXE
C 2048
100 DATA 16,255,21,19,15,111,95,
134,32,173,159,160,2,90,38,249,1
73,159,160,2,90,38,249,48,141,11
,250,204,20,156,131,20,3421
110 DATA 21,166,128,173,159,160,
2,90,38,247,142,8,0,191,20,157,1
41,12,173,159,160,0,39,248,22,1,
110,22,1,107,52,16,2965
120 DATA 190,20,157,48,1,140,16,
18,37,3,142,8,0,191,20,157,134,2
,109,132,42,1,64,53,144,52,54,49
,141,0,28,198,2351
130 DATA 7,61,49,171,198,7,52,4,
166,160,246,20,170,61,231,132,48
,136,32,106,228,38,241,53,4,53,1
82,21,17,17,17,17,2945
140 DATA 17,21,4,20,4,4,4,4,21,2
1,17,1,21,16,16,21,21,1,1,5,1,1,
21,17,17,17,21,1,1,1,21,16,375
150 DATA 16,21,1,17,21,21,17,16,
21,17,17,21,21,17,1,1,1,1,1,21,1
7,17,21,17,17,21,21,17,17,21,1,1
7,474
160 DATA 21,132,127,52,2,83,203,
192,134,32,61,142,40,0,48,139,53
,2,68,86,68,86,48,134,79,88,73,8
8,73,52,18,166,2590
```

```
170 DATA 132,230,101,167,101,53,
2,48,141,0,22,166,134,52,3,72,17
1,97,67,164,102,167,228,166,97,6
1,234,225,53,16,231,132,3635
180 DATA 57,64,16,4,1,132,127,19
3,192,37,4,246,20,175,57,52,6,83
,203,192,134,32,61,142,40,0,48,1
39,53,2,68,86,2666
190 DATA 68,86,48,134,79,88,73,8
8,73,52,18,166,132,167,99,53,2,4
8,141,255,204,166,134,52,3,72,17
1,97,164,100,31,137,3201
200 DATA 166,97,70,37,3,86,32,25
0,50,98,53,16,53,2,57,142,255,19
0,198,10,49,141,0,29,166,160,167
,134,90,38,249,32,3120
210 DATA 30,182,255,35,132,7,138
,224,183,255,34,57,182,255,35,13
2,7,138,232,32,243,8,10,13,14,17
,18,20,2,5,7,141,3043
220 DATA 224,142,40,0,182,20,178
,52,2,72,72,170,228,72,72,170,22
8,72,72,170,224,167,128,140,63,0
,37,7,125,20,201,39,3389
230 DATA 7,111,31,140,64,0,37,23
7,57,198,3,247,20,199,247,21,15,
247,20,201,127,20,166,16,254,21,
19,127,20,165,127,20,3184
240 DATA 164,127,20,163,127,20,1
62,198,3,247,20,196,246,255,3,19
6,252,202,1,247,255,3,127,21,29,
142,0,0,191,20,167,124,3928
250 DATA 21,29,23,255,106,127,20
,201,198,1,247,20,181,127,21,25,
247,21,26,127,21,27,127,21,28,14
2,0,101,191,21,30,48,2780
260 DATA 141,6,17,191,16,18,198,
0,247,20,206,247,20,207,247,20,2
08,247,20,209,247,20,210,127,20,
197,246,20,177,247,20,180,4196
270 DATA 246,20,196,90,52,4,39,1
8,204,64,4,253,20,204,23,5,111,2
52,20,204,139,6,106,228,38,241,2
46,21,15,92,193,11,3365
280 DATA 45,1,90,247,21,15,247,2
0,169,231,228,48,141,10,132,206,
```


NEW!

PUT'S TOMB



Explore the ancient, mystical tomb of the great Pharaoh. Find the magical keys which lead you to unbelievable treasures as you out maneuver the creatures that slither and swarm about you. Super fast arcade action—this one will knock your socks off with 16 screens of incredible color and sound. \$24.95 cassette, \$27.95 disc. Requires 32K.

TIME FIGHTER

Pilot your MD-64 fighter through a hazardous time tunnel. Your mission is to destroy the dreaded Time Guardian who threatens the natural order of the universe. In order to reach this menace you must fight aerial dangers from strange and different time zones. \$24.95 cassette, \$27.95 disc. Requires 16K.



Mark Data Products

24001 Alicia Pkwy., #207, Mission Viejo, CA 92691 • (714) 768-1551

ORDERING INFORMATION: Phone your order for speedy delivery. Use your MasterCard or Visa. We also accept checks and money orders. ALL ORDERS: Please add \$2.00 shipping and handling in the continental U.S. All others, add air shipping and \$3.00 handling. California residents add 6% sales tax. Foreign orders please remit U.S. funds. Distributed in Canada by Kelly Software Distributors. SOFTWARE AUTHORS: Contact us for exciting marketing details.

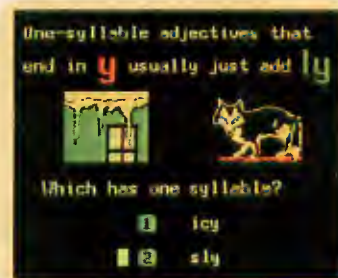
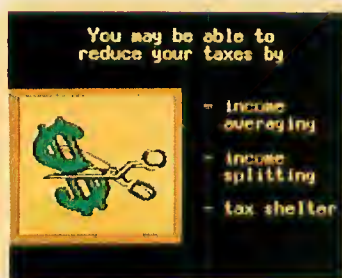
Circle No. 73 on Reader Service Card

254,254,16,142,65,144,246,20,178
 ,16,175,132,23,253,223,167,4159
 290 DATA 137,0,2,23,253,216,167,
 137,0,3,134,100,167,137,0,5,231,
 137,0,4,49,54,48,137,0,6,106,228
 ,38,219,53,4,2795
 300 DATA 134,8,127,20,171,183,20
 ,172,182,20,175,183,20,170,198,1
 91,247,20,161,134,127,183,20,160
 ,141,75,134,9,127,20,171,183,388
 6
 310 DATA 20,172,182,20,175,198,1
 91,247,20,161,134,126,183,20,160
 ,141,52,246,20,178,247,20,192,24
 7,20,194,246,20,175,247,20,193,4
 467
 320 DATA 247,20,195,246,20,176,2
 47,20,191,247,20,170,134,125,183
 ,20,160,134,1,183,20,171,198,190
 ,247,20,161,134,10,183,20,172,42
 65
 330 DATA 141,3,22,0,142,182,20,17
 1,246,20,161,247,20,173,141,110,
 182,20,160,246,20,161,141,102,18
 2,20,171,246,20,161,90,247,3968
 340 DATA 20,161,241,20,172,38,23
 1,182,20,160,246,20,173,247,20,1

61,246,20,172,141,73,246,20,161,
 182,20,160,141,65,246,20,172,419
 7
 350 DATA 182,20,160,74,183,20,16
 0,177,20,171,44,231,57,52,48,190
 ,20,167,48,1,191,20,167,246,20,1
 79,247,20,170,142,63,37,3527
 360 DATA 49,141,9,98,108,164,166
 ,164,129,9,47,13,128,10,167,164,
 23,253,6,48,31,49,63,32,235,23,2
 52,253,53,176,247,20,3330
 370 DATA 174,52,6,246,20,170,52,
 4,246,20,174,23,253,83,53,4,53,6
 ,57,204,65,10,253,20,187,246,20,
 177,247,20,180,190,3515
 380 DATA 20,202,159,141,23,0,191
 ,125,20,169,16,39,0,137,127,20,1
 59,127,21,21,23,2,255,125,20,159
 ,39,3,23,1,4,23,2394
 390 DATA 2,172,79,182,20,180,198
 ,8,177,20,175,38,7,134,120,183,2
 1,23,32,13,125,21,24,39,7,134,25
 5,183,21,23,32,1,2649
 400 DATA 95,250,255,35,247,255,3
 5,127,21,24,198,1,247,20,200,134
 ,251,183,255,2,182,255,0,132,64,
 16,39,252,94,246,21,23,4159

NEW! For Your TRS-80 Color Computer

320 Full-time Audio Talk/Tutor Programs!



We're Your Educational Software Source

Course	No. of Programs
Language Arts (Spelling)	16 Programs
Reading Comprehension	64 Programs
Phonics	32 Programs
English as a Second Language	32 Programs
Mathematics	64 Programs
Basic Algebra	16 Programs
Physics	16 Programs
Effective Writing	16 Programs
History	32 Programs

In Color, with Pictures and Text!

All of our TRS-80 Color programs have easy to understand professional announcer narration, not synthesized, robotic voices. All text is displayed in easy to read upper- and lower-case characters. Video clearly illustrates key concepts in each frame of the program.

Only \$4.40 per program (\$8.80 for 2, one on each side of a half-hour cassette). \$59.90 for 16 programs (8 cassettes) in an album. Send for catalog of over 1000 programs for Atari, TRS-80, Apple, etc.

Dealer inquiries welcome

For more information, or to order call:

TOLL FREE 1-800-654-3871

IN OKLAHOMA CALL (405) 288-2301



DORSETT
 Educational Systems, Inc.
 Box 1226, Norman, OK 73070



410 DATA 90,38,253,134,128,112,2
0,200,42,1,79,183,255,32,13,142,
38,221,190,20,202,159,141,122,21
,29,38,136,198,30,247,21,3535
420 DATA 29,246,20,181,247,20,17
0,190,21,30,48,31,38,21,124,21,2
1,23,0,143,22,253,191,23,1,34,23
,1,31,23,1,28,2255
430 DATA 22,253,179,191,21,30,14
2,63,43,49,141,8,239,106,164,44,
13,134,9,167,164,23,252,33,48,31
,49,63,32,239,166,164,3282
440 DATA 23,252,22,22,255,62,48,
141,8,137,127,20,198,246,21,15,2
47,21,16,191,21,17,141,13,190,21
,17,48,137,0,6,122,2805
450 DATA 21,16,38,239,57,190,21,
17,230,137,0,4,52,4,236,132,23,1
,167,53,4,236,132,171,137,0,2,23
5,137,0,3,31,2726
460 DATA 2,23,1,143,241,20,178,3
8,19,16,175,132,231,137,0,4,246,
20,177,52,4,31,32,23,252,39,53,1
32,241,20,175,16,2873
470 DATA 38,1,6,23,1,134,246,20,
177,247,20,180,127,20,186,198,3,
52,4,125,21,21,38,20,23,252,177,

23,0,40,23,252,2698
480 DATA 160,23,0,34,106,228,38,
240,53,4,32,9,23,0,61,106,228,38
,249,53,4,18,122,20,196,16,38,0,
147,173,159,160,2738
490 DATA 0,39,250,22,252,195,198
,1,182,255,35,138,8,183,255,35,5
2,4,134,128,183,255,32,106,228,3
8,252,231,228,127,255,32,4333
500 DATA 106,228,38,252,53,2,92,
193,192,38,229,57,182,255,35,138
,8,183,255,35,198,252,134,15,52,
2,247,255,32,142,3,232,4135
510 DATA 48,31,38,252,127,255,32
,142,3,32,48,31,38,252,106,228,3
8,232,53,2,142,32,0,48,31,38,252
,57,134,8,52,2,2784
520 DATA 182,255,35,138,8,183,25
5,35,198,252,196,252,134,100,52,
2,247,255,32,134,30,74,38,253,12
7,255,32,134,30,74,38,253,4283
530 DATA 106,228,38,236,53,2,202
,24,84,106,228,38,221,53,2,57,25
2,20,187,253,20,204,204,64,4,52,
2,182,20,196,74,72,3484
540 DATA 52,2,72,171,224,171,224
,253,20,187,51,141,7,64,23,0,159

CP/M™ for your Color Computer

Includes CP/M 2.2 & Utilities
Add Z80A power to your Coco



COCO COUPLER 1 is the low cost way to use the world's largest library of personal and professional programs. Simply plug the COCO COUPLER 1 into the expansion port of your TRS-80 Color Computer and plug the disk controller into COCO COUPLER 1 - no modification to your system is needed. COCO COUPLER 1 contains its own 4 Mhz Z80A microprocessor and firmware for efficient execution of CP/M programs. COCO COUPLER 1 supports WORD—PAK 80 x 24 display board from PBJ Inc.

ONLY the Digital Research CP/M operating system assures you total compatibility.

COCO COUPLER 1 supports both single and double density diskettes.

COCO COUPLER 1 comes complete with CP/M 2.2 diskette and Users Reference Manual.

\$250.00

Shipping Included
MASTERCARD and VISA accepted
California residents add 6%

WAYNE TECHNOLOGY

P.O. Box 5196 • Anaheim, CA 92804-1196 • (714) 772-5757

TRS-80™ Tandy Radio Shack Corp.-CP/M™ Digital Research-Z80A™ Zilog Inc. WAYNE TECHNOLOGY is a licensed distributor of CP/M 2.2

Tax Relief

With Coco-Accountant II

If you pay taxes, you can't afford to be without Coco-Accountant II! This 32K home and small business accounting program has everything you need to keep track of your finances and make income tax time a breeze. Spend a few minutes with your canceled checks, credit card bills, cash receipts and payroll stubs. When you're through, Coco-Accountant II will list and total expenditures and income by month, account or payee, provide a year-to-date summary by account and figure your net cash flow. Better yet, it provides a printed spreadsheet showing your year at a glance.

The program sorts entries by date, lists most functions to screen or printer and saves your files to tape or disk. A special feature flags tax deductible expenses and expenses subject to state sales tax. It even computes the sales tax you paid! In addition, COCO-ACCOUNTANT II includes a separate program to balance your checkbook and print a reconciliation statement. Up to 450 entries per file on 32K tape version, 500 on 32K disk and 700 on 64K disk version. Easy to use, menu-driven, complete documentation. Only \$24.95 on tape, \$27.95 on disk.



Now available for all Color Computers, MC-10's and Model 100's! Use the power of your computer to improve your performance at the track! The Handicapper is two separate programs for thoroughbred and harness horses that apply sound handicapping techniques to rank the horses in each race. Factors include speed, distance, class, track condition, post position, past performance, jockey or driver ability and other attributes. Handicap a race in just a few minutes or a whole card in less than an hour! Easy enough for the beginner, sophisticated enough for the veteran horseplayer. Complete instructions and betting guide. State computer type, Basic version and memory size. Thoroughbred or Harness Handiapper, \$24.95 each on tape, \$27.95 on CoCo disk. Both programs only \$39.95 tape or disk.

Add \$1.50 for shipping and send orders to:

Federal Hill Software
825 William St.
Baltimore, MD 21230



Circle No. 30 on Reader Service Card

,246,20,178,247,20,170,246,20,17
6,247,20,191,252,20,204,4078
550 DATA 253,20,187,124,20,197,2
2,1,68,127,21,22,124,21,24,236,1
32,171,137,0,2,235,137,0,3,129,1
,39,30,129,125,39,2776
560 DATA 26,193,10,39,22,193,190
,39,18,23,253,97,109,137,0,5,39,
9,106,137,0,5,38,3,122,20,169,23
6,132,235,137,0,2742
570 DATA 3,141,48,241,20,178,39,
7,96,137,0,3,124,21,22,236,132,1
71,137,0,2,141,28,241,20,178,39,
7,96,137,0,2,2647
580 DATA 124,21,22,125,21,22,38,
8,96,137,0,2,96,137,0,3,236,132,
57,52,16,23,250,237,53,144,247,2
0,174,230,98,52,2873
590 DATA 20,246,20,174,23,250,15
4,53,20,231,98,57,51,141,6,143,4
9,141,1,196,198,5,52,4,230,192,2
47,20,170,252,20,187,3651
600 DATA 171,160,235,160,23,253,
23,106,228,38,237,53,4,57,23,1,1
53,182,20,177,246,255,0,196,2,38
,3,182,20,175,183,20,3624
610 DATA 180,182,1,93,128,32,183
,20,183,64,183,20,182,182,1,92,1
28,32,183,20,184,64,183,20,185,9
5,247,20,186,142,20,181,3616
620 DATA 134,4,225,134,44,5,230,
134,183,20,186,74,38,244,193,20,
46,3,127,20,186,57,141,148,182,2
0,186,16,39,1,70,72,3182
630 DATA 142,15,238,48,134,252,2
0,187,171,132,235,1,253,20,189,2
3,250,83,241,20,175,16,39,1,44,2
41,20,177,16,39,1,37,3460
640 DATA 241,20,176,16,38,0,137,
247,20,191,246,20,176,247,20,170
,247,20,191,16,190,16,18,182,20,
186,16,140,16,20,39,8,3290
650 DATA 167,160,252,20,189,253,
20,187,252,20,187,32,7,16,190,16
,18,23,252,106,16,140,16,20,39,5
7,142,2,0,48,31,38,2916
660 DATA 252,166,162,74,72,48,14
1,1,1,48,134,252,20,187,171,128,
235,132,253,20,187,23,252,70,166
,164,74,72,48,141,0,234,3928
670 DATA 48,134,252,20,187,171,12
8,235,132,253,20,187,23,252,47,1
6,140,16,20,38,197,246,20,176,24
7,20,170,252,20,187,23,252,4129
680 DATA 29,49,141,0,207,16,191,
16,18,125,20,197,38,85,32,77,241

,20,178,38,72,182,20,180,177,20,
 175,16,38,0,134,247,2979
 690 DATA 20,191,16,190,16,18,16,
 140,20,20,38,6,246,20,176,22,255
 ,85,182,20,186,167,160,16,191,16
 ,18,246,20,175,247,20,3159
 700 DATA 170,182,20,186,49,141,0,
 122,74,72,49,166,252,20,187,171,
 164,235,33,23,251,200,171,164,23
 5,33,23,251,193,252,20,189,4298
 710 DATA 253,20,187,127,20,197,4
 9,141,0,78,51,141,5,17,198,5,52,
 4,246,20,180,247,20,170,252,20,1
 87,171,160,235,160,52,3665
 720 DATA 6,23,249,65,241,20,177,
 38,14,246,20,178,182,20,180,177,
 20,175,38,3,124,20,159,231,192,5
 3,6,23,251,128,106,228,3593
 730 DATA 38,214,53,4,57,252,20,1
 87,32,182,110,159,160,10,0,0,0,2
 ,0,254,2,0,254,0,0,0,1,1,1,255,2
 55,1,2504
 740 DATA 255,255,0,1,0,255,1,0,2
 55,0,0,255,0,1,255,0,1,0,16,20,0
 ,0,0,0,0,0,0,0,0,0,0,0,0,1570
 1060 DATA 0,0,0,0,0,0,0,0,0,0,0,0,
 0,0,0,0,0,0,0,0,0,0,32,32,32,32,
 32,32,32,32,32,32,84,404
 1070 DATA 82,65,80,39,69,77,13,1
 3,32,32,32,32,32,32,32,32,32,32,
 32,32,32,32,32,32,32,32,32,32,
 ,32,32,32,1206
 1080 DATA 13,32,32,32,32,32,66,8
 9,32,77,65,84,84,72,69,87,32,71,
 32,67,73,77,66,65,76,65,13,13,32
 ,32,80,82,1774
 1090 DATA 69,83,83,32,65,78,89,3
 2,75,69,89,32,84,79,32,83,84,65,
 82,84,32,71,65,77,69,13,32,80,82
 ,69,83,83,2145
 1100 DATA 32,34,66,82,69,65,75,3
 4,32,84,79,32,82,69,83,84,65,82,
 84,32,71,65,77,69,13,13,13,13,13
 ,0,0,0,1612
 1110 DATA 0,0,0,0,0,0,0,0,0,0,0,0,
 0,0,0,0,2,0,1,3,2,0,1,0,0,0,0,0,
 0,0,0,0,0,9
 1120 DATA 0,0,0,0,0,0,0,0,0,0,0,0,
 2,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
 0,0,0,0,0,2
 1130 DATA 0,0,0,0,0,0,0,0,0,0,0,0,
 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
 0,0,0,0,0,0
 1140 DATA 0,0,0,0,0,0,0,0,0,0,0,0,
 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
 0,0,0,0,0,0

SOFTMART JUNE SALES

ALL ITEMS IN STOCK AND READY FOR IMMEDIATE SHIPPING
 SALE PRICES GOOD UNTIL JULY 20.

ARCADE

CATALYST (MICHTRON)	14.95 (C) / 19.95 (D) (16K)
JUNIOR'S REVENGE (COMPUTERWARE)	25.95 (C) / 28.95 (D) (32K)
THE GREAT USA (SUGAR)	17.95 (C) (16K & 32K EXT.)
COLOR FURY (MICHTRON)	24.95 (C) / 26.95 (D) (16K OR 32K)
CU*BER (TOM MIX)	24.95 (C) / 26.95 (D) (32K)
TIME BANDIT (MICHTRON)	24.95 (C) / 26.95 (D) (32K)
MS GOBBLER (SPECTRAL ASSOCIATES)	21.95 (C) / 25.95 (D) (16K)
THE KING (TOM MIX)	24.95 (C) / 28.95 (D) (32K)
TOUCHSTONE (TOM MIX)	24.95 (C) / 28.95 (D) (32K)
DEVIL ASSAULT (TOM MIX)	24.95 (C) / 26.95 (D) (16K EXT.)
MOON SHUTTLE (DATA SOFT)	25.95 (C OR D) (32K)
LUNAR PATROL	21.95 (C) / 24.95 (D) (32K)
(SPECTRAL ASSOCIATES)	
GALAGON (SPECTRAL ASSOCIATES)	21.95 (C) / 25.95 (D)
COLORPEDE (INTRACOLOR)	25.95 (C) / 30.95 (D) (16K)
LANCER (SPECTRAL ASSOCIATES)	21.95 / 25.95 (D) (16K)
CASHMAN (MICHTRON)	24.95 (C) / 27.95 (D) (32K)
FROGGIE (SPECTRAL ASSOCIATES)	21.95 (C) / 25.95 (D) (32K)
GLAXXONS (MARK DATA)	22.95 (C) / 26.95 (D) (16K)
DEMOND SEED (MICHTRON)	23.95 (C) / 27.95 (D) (32K)
OUTHOUSE (MICHTRON)	25.95 (C) / 26.95 (D)
BLOC HEAD (COMPUTERWARE)	23.95 (C) / 26.95 (D) (16K)
TIME PATROL (COMPUTERWARE)	23.95 (C) / 26.95 (D)
ZAXXON (DATASOFT)	35.95 (C OR D) (32K)

AND MORE

Become a Preferred Customer of **SOFTMART** and Receive:

- Free Monthly Sales Sheet
- Descriptive Catalog with Over 2000 Programs for CoCo
- 20 Different Categories (Arcade-Utility)
- 48 Hour in Stock Shipping
- 30 Day Money Back Guarantee
- User's Group Purchasing Program
- Acceptance of Checks with No Delay in Mailing
- Open Door Policy on Additions to Our Product Line
- New BBS Line
- Visit Our New Store Location in Northside Center

PLACE AN ORDER FROM THIS AD OR SEND US YOUR NAME

AND ADDRESS AND WE WILL SEND YOUR

APRIL SALES SHEET AND OUR

FREE CATALOG

- Dealer Inquiries Welcomed

Mail Orders: Send Check or M.O. VISA & MC Welcomed.

P&H \$2.00 Ground \$4.00 Air.

NC Res. Add 4% Sales Tax. COD Orders \$2.00 Extra.

SOFTMART

5024 E. Departure Drive
 Raleigh, NC 27604
 (919) 876-6124

Circle No. 58 on Reader Service Card

ON- LINE

by Terry Kepner

WE LAST COVERED SIG databases, but didn't mention one important one: the X database, an information-only section available in each SIG database. At any SIG Function prompt, when you enter x_n , (where n is a number from 0 to 11) the database will automatically begin listing everything in it to your computer. These X databases are set up by each SIG's Sysop, and only *he* can put information in them. They are used to tell users about the system. For example, x_5 in the Model 100 SIG gives a brief explanation of the database commands and how to use them. Newcomers are told to download this section when they have questions about use of the databases. Another SIG Sysop uses an X database to explain how to retrieve and leave messages. The Sysop generally tells you which X databases are enabled for that SIG when you sign on as a first-time user.

The control codes used in the BBS section of the SIG also work in the database section: Control A stops output with the current line; Control C aborts the listing in progress; Control S pauses the listing; Control Q resumes listing after a Control S; and Control P returns you to the database prompt.

User Command Mode

Now that you know how to maneuver around the SIG, and know your options,

you can get rid of repetitive menus and long-winded prompts by using the advanced user command mode. This mode assumes you've memorized all functions, menus, and prompts in the SIG. You receive short and concise messages instead of long multiple choice menus; you also have many other options.

To select this mode, select Option 9 of the main SIG Function menu. You'll then be given a second menu, listing four choices: change to advanced command mode; change terminal line length LL ; return to Function prompt or menu T ; and make these changes permanent P .

The second option is a quick and easy way to change your terminal line length parameter without leaving the SIG and going to CIS-4. Option three takes you out of the option-setting section of the SIG and back to using it. Option four is self-explanatory. Option one is what we will explore.

When you select option one, a list of possible options is displayed (see The User Options list). Your current option settings are indicated by an asterisk or a number following the option. Only some options require a number, such as line length, default log-in section, and number of lines on your display page. This is the only section that will put multiple commands on one line, which is a time-saving feature since otherwise the entire list of options is printed every time you press Enter.

The *default* settings are ST (stop and send a prompt after each message listed), $LL64$ (line length is 64 characters), NPG (don't break the messages into pages, scroll continuously until the end of the message is reached), NB (don't abbreviate the prompts), MWM (mark any messages addressed to you), and RNT (read new command, list all messages, including those left by you).

This is the only section that will put multiple commands on one line, which is a time-saving feature since otherwise the entire list of options is printed every time you press Enter.

First set the line length to 32 (if it isn't already): $LL32$. Next, set the messages to non-stop mode: NS . This means the SIG won't stop after every message to ask if you want to continue, reply to the message, or return to the Function prompt or menu. This will save you time, and therefore, money. The disadvantage is that you can't stop the scroll and send a reply. (When you abort the message scroll you return to the Function prompt, so if you want to reply to a message you must select that message via the RI command, which asks, after displaying the message, if you want to reply.) The only time the scroll stops is when a message addressed to you is reached. You are then asked if you want to continue, reply, return, or delete the message.

BR stops repetitious displays of options. To make these changes permanent (you won't have to set them every time you access the SIG) type P . Making these changes one at a time wastes time, since user options are redisplayed each time. Use multiple commands; to set non-stop mode, 32 character line length, stop repetitious display, and set permanent changes, type $NS;LL32;BR;P$. When the user option list is displayed, check to see that all the options you selected were indeed changed.

More Options

These are not all your options. To organize your screens into 16-line pages, use the PG option. The PG option requires that the ST (stop between messages) option also be selected. To automatically skip messages you left when you would use the RN command to read new messages, use the RNS option command. If you don't like the prompt character used by the SIG, change it with the PC option command. If you want messages left for you to automatically and immediately be typed out when you sign on, use the TWM option command. Other options are listed in the Advanced Options list.

Illustration by Rod McCormick



THE INTRONICS EPROM PROGRAMMER

Price: \$140.

Newly Designed Unit NEW VERSION 2.4

- ☐ Plugs into ROM pack port.
- ☐ Now programs 8K X 8 EPROM in 15 Seconds.
- ☐ On board firmware included.
- ☐ No personality modules required.
- ☐ Will program most EPROM's.
- ☐ High quality zero insertion force EPROM socket.

Enclosed in
Molded Plastic Case



SPLC-1 Lower Case FOR THE COLOR COMPUTER & TDP-100

FULLY ASSEMBLED, TESTED
& GUARANTEED FOR 90 DAYS

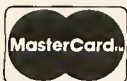
\$59.95

- ☐ TRUE LOWER CASE CHARACTERS ☐ NO CUTTING OR SOLDERING ☐ FULLY COMPATIBLE WITH ALL TRS-80C (SPECIFY REVISION BOARD) [NOT COMPATIBLE WITH COCO 2] ☐ INVERTED VIDEO AT A FLIP OF A SWITCH

YOUR SOURCE FOR THE COLOR COMPUTER

- * DRIVE 0 FOR COCO\$329
- * DRIVE 1 FOR COCO\$229
- * GUARANTEED FOR ONE FULL YEAR

- DISK CONTROLLER FOR COCO\$139
- SATURN RS-232 PORT EXPANDER\$ 30
- POWER-ON L.E.D. KIT\$ 6
- FRONT RESET SWITCH KIT\$ 7
- LIBRARY CASE HOLDS 70 DISKS\$ 23
- NEW MULTI-COLOR RAINBOW DISKS ..\$ 25
- ELEPHANT DISKS SSDD\$ 23
- 8 PRIME 64K RAM-CHIPS\$ 50
- GEMINI 10X PRINTER\$299
- HAYES SMART MODEM 300\$215
- F-A-S-T- UPGRADE SERVICES\$CALL!



(Dealer Inquiries Invited)

- MINIMUM \$2.00 SHIPPING & HANDLING.
- NYS RESIDENTS ADD SALES TAX.
- ALL OTHER ORDERS ADD 4% SHIPPING.



NEW SOFTWARE

OS-9BBS\$89.95

- ☐ MULTI-USER CAPACITY ☐ FASTER THAN MOST BBS's
☐ MULTI-TASKING (NO LONGER COMPLETELY TIES UP YOUR COCO) ☐ REQUIRES OS-9 AND BASIC 09

OS-9 40-Track
Program\$24.95

- ☐ NOW OPERATE 35/40/80 DOUBLE SIDE, DOUBLE DENSITY DRIVES UNDER OS-9

64K Terminal
Package\$24.95

- ☐ AFFORDABLE ☐ REQUIRES 64K MEMORY ☐ GIVES YOU 52-58K BUFFER ☐ WRITES TO DISC ☐ READS IN FROM DISC ☐ STANDARD DISPLAY

62 COMMERCE DRIVE
FARMINGDALE, NY 11735
(516) 249-3388

1983 unit sales	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Average	Best	Worst
Bach	136	139	119	161	130	104	84	121	95	115	75	161	1440	115	161	75
Chalone	120	170	152	170	182	102	89	157	162	129	64	158			182	64
Dolan	188	157	103	112	161	122	99	145	145	103					188	97
Feagan	105	94	127	115	157	97	61	132	113						174	61
Graham	135	135	183	116	151	104	86	149							183	63
Harpel	134	102	190	161	180	85										
Jordan	105	109	188	171	120											
Latour	112	128	124	129												
Lucido	158	110														
Phelps	167															
Prats																
Schaeferle																
Taylor																
Torres					131											
Turner				127	131											
Wehlen			145	142	154											
	2312	2166	2387	2321	2401	1699	1439	2276	2242	2011	1318	2631	25203	2100		

DYNACALC[®]
FOR COCO DOS
 NO OTHER OPERATING SYSTEM NEEDED!

THE BEST OF BOTH WORLDS!

available from



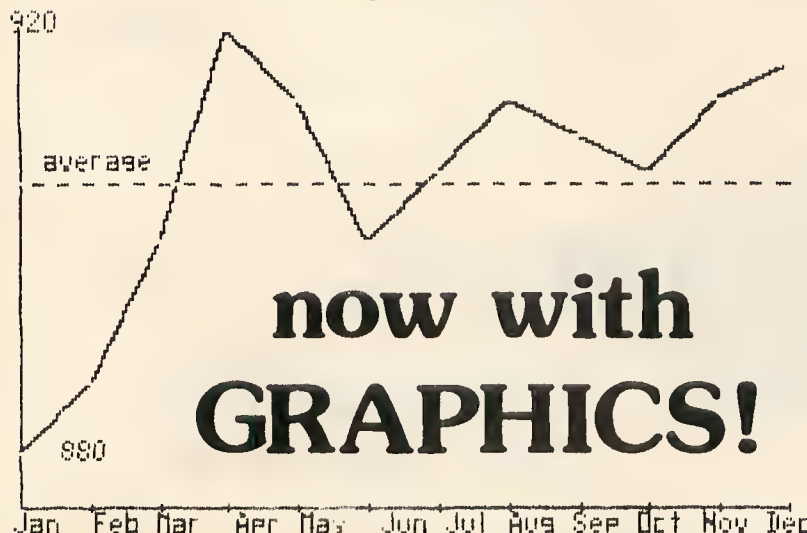
COMPUTER SYSTEMS CENTER
 13461 Olive Blvd.
 Chesterfield, MO 63017 USA
 (314) 576-5020

CSC

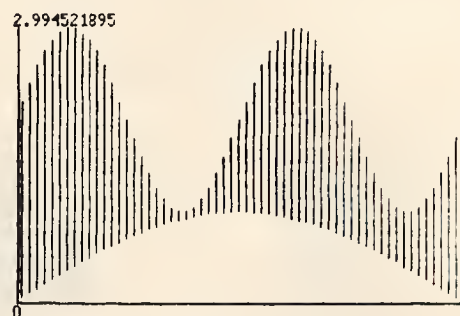
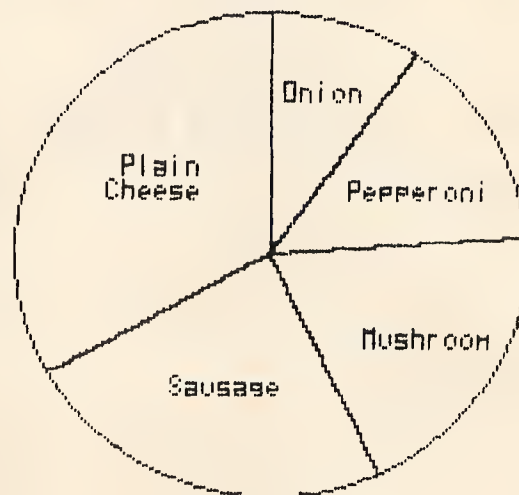
or your local DYNACALC dealer

Price \$150 postpaid in US & Canada.
 Outside North America add \$10 postage.

DYNACALC Reg. U. S. Pat. Off.



**now with
 GRAPHICS!**



CANADA
MICRO R.G.S. INC.
 751, CARRE VICTORIA, SUITE 403
 MONTREAL, QUEBEC, CANADA, H2Y 2J3
 Regular Tel. (514) 287-1563
 Canadian Toll Free 800-361-5155

After making permanent changes, issue the command T to return to the Function prompt, which is all you'll see: the menu has been suppressed.

Be careful with these options; it's easy to get confused and lost. One item that'll help is the "SIG'er REF" reference card from Interpro (P.O. Box 4211, Manchester, NH, 03108, \$5.85), which lists SIG commands, their syntax, and useful information about the SIGs.

Congratulations, now you're a professional SIG user; you can easily and quickly move from one area to another, getting the most information possible, and wasting little time wondering what to do and how to do it!

EMAIL

Now let's explore the EMAIL service. Leaving messages on the SIG BBS is easy if you know they'll be on the service before the message has a chance to scroll off. But if the action is fast and furious, as it is on some SIGs, you'd have to sign on every three or four days not to miss any messages. And what if the recipient of the message isn't a member of the same SIG as you are? EMAIL to the rescue!

EMAIL is an electronic mail service available to CompuServe members. To use EMAIL, just go to the EMAIL section of CompuServe and address and compose your message. That's it: in actual execution, the procedure is a bit more complex.

To get to the EMAIL section, type GO EMA. When you get to page one (EMA-1), you have two choices: read mail, or compose and send mail.

To read mail, select option one and

*"Leaving messages is
easy unless the action
is fast and furious:
EMAIL to the rescue!"*

you'll be given a numbered list of people who've sent you EMAIL messages since the last time you read your mail. (By the way, when people send you EMAIL, CompuServe gives a brief notice EMAIL is waiting when you next sign on.) Select the message you want to read and get ready for the message's transmission. After the message is displayed you can re-read the message, save it to your per-

sonal programming disk space, or have it erased from your EMAIL mailbox and your disk space.

Composing and sending a message is more difficult. All messages require the PPN number (CompuServe user ID number) of the recipient. If you only know the person's name, you'll have to check the user database in the Public Access section and see if the person has left his name and PPN in the files.

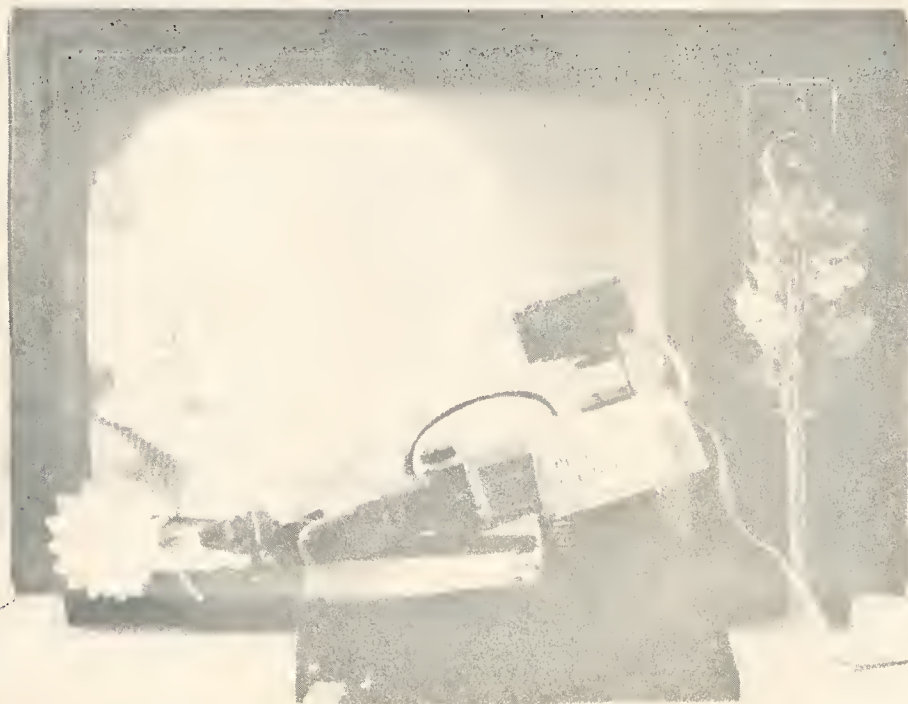
Armed with the recipient's PPN, you're ready to compose your message. Select option 2 from page EMA-1 to take you to page EMA-4. EMA-4 lists eight options: the first three create messages; the next two edit messages; the sixth places your message in the recipient's EMAIL box for delivery; and the last two lead to help sections on the two text editors available in EMAIL.

Procedures

The first three options create a message file and are used with the Filge file editor or the ICS file editor, or by copying it from your disk space in the Personal Programming Area.

The Filge text editor is line oriented: your file is treated as a series of discrete

Computer Servo Controlled Robot Arm



Call or Write for Free Catalog

Analog Micro Systems

5660 Valmont Road • Boulder, Colorado 80301 • Tel: (303) 444-6809

Robot-1

Keyboard or Joystick Control

**Remembers Everything It Did
& does it again**

Typical System Includes:

- Robot-1 & Cables
- 6 Channel Servo Controller
- Power Supply
- All Software with source code

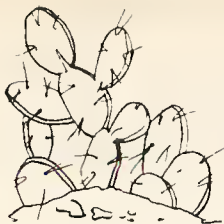
Modular Robotic Accessories:

- Mobile Cart for Traveling Robot
- Radio Links between all Functions
- Robot-mounted MicronEye
- Ultrasonic Range Finder

Robot-1 Series

starting at \$289.00
for the Color Computer
and 6809 \$550 Computers

Additional Systems Available
Robot-1R for Radio Control Systems



PRICKLY-PEAR SOFTWARE

QUALITY PROGRAMS FOR YOUR COCO & TDP-100

PROGRAMS REQUIRE 16K EXTENDED BASIC FOR TAPE, AND 32K DISK UNLESS OTHERWISE NOTED.

COLOR DISK TRIVIA

WITH DEVELOPMENT SYSTEM FOR EDUCATIONAL USE

Here it is! The first new program offered by the author of the famed **VIKING!** in nearly two years, and worth the wait.

Color Disk Trivia

is simply a very good, and very fun to play game. It has everything going for it: The challenge of trivia, ease of use, a good social game encouraging conversation, and you may even learn something! The development system (included) even lets you easily create your own custom question disks.

The play of the game is easy to understand, because the computer does all the work for you. It even looks up and presents the proper question!

On each question disk there are five categories, and there are an amazing 1100 questions on each disk. No, that's not a misprint, we said 1100 questions per question disk! Yes, that is a pretty full disk. Because the questions are stored on the disk, instead of in memory, you can play **COLOR DISK TRIVIA** on any size Color Computer system with one disk drive — 16K, 32K, or 64K.

There are already five question disks available, and you get the **GENERAL** disk when you purchase the game. That's correct, there are already FIVE question disks with a total of 5500 questions available for shipment **RIGHT NOW**, with more on the way shortly.

All question disks have five categories and 1100 questions. The disks available now are:

GENERAL: (Included with the game) The categories for this disk are history, the written word, movies & television, science & the world, and sports.

ENTERTAINMENT: These categories are movies, the stage, television, music, and literature.

BIBLE: 1100 questions in five categories on the Old and New Testaments.

SPORTS: This disk will challenge even the very knowledgeable sports fan. All major sports (and some minor ones) are represented.

CHILDREN: No, this isn't questions ABOUT children, it's questions FOR children. 1100 fun questions just for the younger set.

The game of **COLOR DISK TRIVIA** can be played by from 1 to 4 people (or teams), and you set the length of the game at the start when you decide how many questions must be answered in each category to win. The computer chooses the categories randomly, though sometimes it will let you choose the category for yourself (or let your opponents choose for you). Because of this category selection by the computer, a single category can often hold you up while one of your opponents slips by to win. The outcome is always in doubt, and no player is ever eliminated.

Trivia lovers will enjoy the fact that you can play without other people if you desire, because the computer will provide plenty of challenge. We want to emphasize that this is, first and foremost, a fun game.

Your Personal check is welcome - no delay. Include \$1.50 shipping for each program ordered. (Shipping free on \$50.00 or larger orders). AZ residents add 7% sales tax. Orders shipped within two days.

The Development System

Naturally, in order for our programmers to type in thousands of questions easily and accurately, a good development program to create the question disks had to be written, and we include this program with the game at no additional charge!

The program is all menu-driven and very user-friendly. That means that no knowledge of programming is needed to use it. If you can turn on your computer and type, you're all set! Now sit back and imagine the educational possibilities.

Yes, our question disks have 1100 questions, but the game program will handle question disks having any number of questions from 5 up to a full disk of 1100, so a teacher can type in 50 or 100 questions and answers (the questions are multiple choice), and then the students can play the "game" and have a great time, while accidentally picking up the lesson. Let the natural spirit of competition fuel the learning process.

The development program is very easy to use, and gives you options to add questions, change or delete a question, and print the questions and answers on the screen (or a printer, if you have one). You can develop a question disk and easily add questions to it any time you wish.

This program finally gives parents and teachers the opportunity to easily create a custom learning program for any level student, and if we keep it a secret, no-one need know it's more than a game.

TECHNICAL INFORMATION: **COLOR DISK TRIVIA** is a mixture of Machine Language and BASIC. It uses Fielded Direct Access Disk Files. **COLOR DISK TRIVIA** requires 16K and at least one disk drive.

ORDERING INFORMATION:

COLOR DISK TRIVIA GAME with **QUESTION DEVELOPMENT SYSTEM** and **GENERAL** question disk containing 1100 QUESTIONS: **\$29.95**

ADDITIONAL QUESTION DISKS:

THE BIBLE: 1100 questions on the Bible. **\$19.95**

ENTERTAINMENT: 1100 questions on movies, TV, stage, music, and literature. **\$19.95**

SPORTS: 1100 questions for the sports fan. **\$19.95**

CHILDREN: 1100 questions for the younger set. **\$19.95**

FOR A LIMITED TIME, buy the game for **\$29.95** and select an additional disk of your choice for ½ price! That's a **\$49.90** value for just **\$39.95**. You save \$10, and we will pay the shipping.

Dealer and author inquiries are always welcome. Canadian dealers should contact Kelly Software Distributors, Ltd., P. O. Box 11932, Edmonton, Alberta T5J-3L1 (403) 421-8003

Stocked by Quality Dealers, or

Send Order To: **PRICKLY-PEAR SOFTWARE**

8532 E. 24th Street
Tucson, Arizona 85710
(602) 886-1505



un-numbered lines. Use Filge commands to maneuver through the file; the current line is always the one being edited. All Filge commands begin with a slash (/), and end with either the Enter key or the Escape key. (Refer to your communication software instructions for the placement and use of the Escape key.) Any text entered that doesn't begin with a slash is considered part of the file's data. Maximum line length is 140 characters.

When you first enter Filge your file area will be empty. Type your message; if you make a mistake on the line you're typing, use the backspace key and retype your correction. When you get to the end of your display line (remember the maximum line length), press Enter for the next line (limiting the line length to one display line makes it easier to correct things later).

If you notice an error in one of the previous lines, there are several ways to move from the current line to the line with the error. The easiest way is to type /Nn, where n is how many lines to move. If n is negative, you'll move back (up) that many lines. Typing /N without any n moves you to the next line.

The Next line command doesn't display the new current line unless you spe-

cifically tell it to do so by terminating it with the Escape key: thus, typing /N-1\$ (the dollar sign is used by Filge to acknowledge that you typed the Escape key) will move you back one line and display that line.

Once you've changed this current line pointer to the correct line, make your corrections. Since Filge is a line-oriented text editor, you can't just go to the error

*"Composing and sending
a message is more
difficult. You need
the recipient's PPN..."*

and type over it: you have to replace it with the corrected text.

To do this use the Change command: /C/oldstring/newstring. This command has several options. If you want to delete the old string, type /C/oldstring. To insert a new string at the beginning of the current line, type /C//newstring. If the alteration in the current line is the same as the last change, just type /C. And if you have sev-

eral old strings in the current line and need to change only one of them, use /Cn/oldstring, where n is the number of the occurrence of the old string which you want changed.

To replace a slash, use the comma as a delimiter. If you have to change the same old string in many different lines to a new string, use the Global change command: /GC/oldstring/newstring. /GC/oldstring will search for "oldstring" and erase it each time it's found. If you need to replace only the nth occurrence of the old string, the format is: GCn/oldstring/newstring.

Like the Next Line command, to have the line displayed terminate the Filge command with the Escape key instead of the Enter key.

If you know something is misspelled but don't know where it is in your file, go to the top of the file with the /T command, then use the locate command: /L/string. This moves the current line pointer to the first line following that contains the specified string. End the command line with the Escape key if you want the line displayed when the string is found.

Should you forget which line you're on, use the /P command to display the current line. If you want to see the next

PARALLEL PRINTER INTERFACE

FOR THE RADIO SHACK COLOR COMPUTER

- * Runs any parallel printer from the Color Computer serial I/O port.
- * No hardware modifications or software patches needed. Works with all standard Color Computer commands including graphics.
- * Switch selectable baud rates from 300 to 9600.
- * All cables and connectors included.
- * Most printers supply power at the parallel port. With these printers you may order your interface without the power module. Printers that require the power module are: Epson, Panasonic, Smith-Corona TPI, Centronics, and Mannesman Tally.
- * Modem users ! You may order your Botek interface with a modem cable and switch to select between your printer and modem. Several modem connectors are available, so please tell us what modem you have.
- * Price: Model CCP-1 ----- \$ 69.
Model CCP-2 -with modem cable and switch--- \$ 84.
Either model without power module deduct --- \$ 3.
Shipping costs included in price.
Michigan residents add 4% sales tax.
- * 1 year warranty.



* We carry the finest disk drive system that you can use with your Color Computer. The system includes: TEAC double sided disk drive, drive enclosure and power supply, J & M disk controller, and cable. We configure the TEAC drive so that it can be used as two single sided drives or as a double sided drive. The J & M disk controller is Radio Shack compatible ----- \$ 425.

* PRINTER SPECIALS *

C-ith Prowriter plus CCP-1 ----- \$ 389.
Gemini 10X plus CCP-1 ----- \$ 339.

Order from:

BOTEK INSTRUMENTS

313 739-2910

4949 HAMPSHIRE, UTICA, MICH., 48087

Dealer inquiries invited

$n - 1$ lines, use /Pn (since one of the n lines is the current line). The current line pointer is moved to the last line displayed. If you want the current line deleted, type /D. To remove several lines, type /Dn, which deletes n lines, including the current line.

To replace the entire current line with new text, use the /Roldline/newline command. The current line pointer isn't changed.

Since you can use the /C//newstring command to add to the beginning of the current line, you need some way to add to the end of the current line: /A/string does this for you. If you don't specify a string, the last string used with the Append command is used again.

To jump to the last line of your file without using /N or /P, use the /B command: don't forget to terminate the command with the escape key if you want the last line displayed.

The final Filge command is /EX, which removes you from the Filge editor and takes you back to EMA-4. For a complete list of the Filge commands, see the Filge Commands list.

Advanced User Options (OP)

Menu

- 1 — Change top command mode.
- 2(LL) — Change line length.
- 3(T) — Return to function menu.
- 4(P) — Make options permanent.

Multiple user option commands can be placed on one line; i.e.:

OP;LL80;T;RF1000.

User Command Mode Options

- T — return to function prompt/menu
- ST — stop between messages (*)
- NS — don't stop between messages
- LL — change line length (64)
- NL — number of displayable lines on terminal (16)
- PG — page the output, length set by NL. Works only if ST is enabled
- NPG — no paging (*)
- RNS — makes RN command skip messages you left
- RNT — makes RN command list messages you left
- BR — brief mode, stops repetitious displays of options
- NB — turns off Brief (BR) mode (*)
- PC — change prompt character
- TWM — type waiting messages
- MWM — mark waiting messages (*)
- CN — change your SIG name
- DS — set default log-in message section (0)
- RNT — RN command types all messages (*)
- P — makes changes permanent

MEN — turn off command mode, use menus

Options chosen are indicated by asterisks, those with numerical values give the current value. Normal default settings are shown above. Not all commands are available; some Sysops have disabled the CN command.

Filge Editing Commands

- /A — append
 - /A/new — add newstring to end of current line
- /B — bottom, go to bottom of file
- /C — change, current line only
 - /C/old/new — replace oldstring with newstring
 - /C/old — delete oldstring
 - /C//new — add to beginning of current line
 - /C — make same change to current line as last time
 - /Cn/old/new — change n th occurrence of oldstring
- /D — delete: remove current line
 - /Dn — remove n lines
- /EX — exit Filge
- /GC — global change, entire file
 - /GC/old/new — replace oldstring with newstring throughout file
 - /GC/old — delete oldstring throughout file
 - /GCn/old/new — replace n th occurrence of oldstring with newstring
- /L — locate
 - /L/string — search file from current line to end of file for string
- /N — next line, move current line pointer
 - /N — move down one line
 - /Nn — move down n lines
 - /N-n — move up n lines
- /P — print, display lines
 - /P — display current line
 - /Pn — display n lines, put current line pointer to last line displayed
- /R — replace
 - /R/old/new — replace old line with new line
- /T — top, move pointer to top of file

Repeat commands by placing the repeat count n in front of the command.

Terminate commands with the Escape key to make current line display after command is executed.

Put multiple commands on one line by separating them with commas; use apostrophes as delimiters instead of slashes; i.e., /T,L'ABC',C'A'XXX'\$ will go to top of file, search for the line with ABC, change the A to xxx, and display the current line. If you want to display lines via the Escape key, use the semi-colon instead of a comma.

Multiple commands on a line can be repeated by putting them in parentheses, preceded by the multiplying factor.

Enter CompuServe's Electronic Mall™ and shop at your convenience in these exciting departments.

The Micro Mart
The General Store
The Travel Agent
The Book Bazaar
The Record Emporium
The Photo Booth
The Software Shop
The Financial Market
The Magazine Kiosk
The Gardening Shed
The Newsstand

A sample of the companies participating in CompuServe's Electronic Mall™ includes:

Amdek
American Airlines
American Express
AST Research
Bank of America
Bantam
Big T Automotive
Buick
CBS Publishing
CDEX
Colonial Penn
Commodore
Computer World
Digital Equipment
dilithium Press
800 Software
47th Street photo
Grolier
Harvard Business Review
Heath
Heinold Commodities
Hertz
E.F. Hutton
Inmac
Innovative Software
Knapp Press
Magazine Entree
Magazine Supply House
Manufacturer's Hanover Trust
Max Ule
McGraw-Hill
Metropolitan Life
Microsoft
Miracle Computing
Misco
Newsnet
Novation
Official Airline Guide
Pan American Electronics
Peachtree Software
Practical Peripherals
Program Store
Professional Color Labs
RCA Record Clubs
Record World
Sears
Select Information Exchange
Sim Computer Products
Simon and Schuster
Small Computer Book Club
Software Advisor
Stark Brothers
Supersoft
Vanguard
VisiCorp
Waldenbooks
Woman's Day Books
Ziff-Davis

Merchants and manufacturers who want to participate in the Electronic Mall™ may contact: Stephen A. Swanson, L.M. Berry & Co., P.O. Box 6000, Dayton, OH 45401, (513) 296-2015.



BY THE YEAR 2000, THE WORLD MAY CATCH UP WITH THE WAY COMPU SERVE'S NEW ELECTRONIC MALL LETS YOU SHOP TODAY.

Introducing the first computer shopping service that brings you convenience, savings and enjoyment.

Here's your chance to expand the practical uses of your personal computer.

Sign up for CompuServe and shop in our new Electronic Mall. It's easy to use. It tells you more about the products you're buying. It lets you order faster. And it's totally unique.

CompuServe's new Electronic Mall™ offers you all these shopping innovations.

– It's enormous! So it gives you in-depth information on thousands of goods and services, and lets you buy even hard-to-find merchandise. – Its unique "Feedback" service lets you ask the merchants themselves specific questions. – It's incredibly efficient in ordering the products and services you want.

– Its special discount opportunities make it economical, purchase after purchase. – And its name-brand merchants assure you of top-quality merchandise.

Make the CompuServe Electronic Mall 15-Minute Comparison Test.

*What you can do in 15 minutes shopping
the Electronic Mall way.*

- Call up on your computer screen full descriptions of the latest in computer printers, for instance.
- Pick one and enter the order command.
- Check complete descriptions of places to stay on your next vacation.
- Pick several and request travel brochures.
- Access a department store catalog and pick out a wine rack, tools, toys... any thing!
- Place your order.

*What you can do in 15 minutes shopping
the old way.*

- Round up the family and get in the car.

The Electronic Mall, a valuable addition to the vast world of CompuServe.

CompuServe's Consumer Information Service brings you shopping information, entertainment, personal communications and more.

You can access CompuServe with almost any computer and modem, terminal or communicating word processor.

To receive your illustrated guide to CompuServe and learn how to subscribe, call or contact...

Circle No. 69 on Reader Service Card

CompuServe

Consumer Information Service
P.O. Box 20212
5000 Arlington Centre Blvd.
Columbus, OH 43220

800-848-8199

In Ohio call 614-457-0802

The Electronic Mall™ is a cooperative venture between CompuServe Inc., and L.M. Berry & Company.

An H & R Block Company

Learning To Program in C

by Thomas Plum
Prentice-Hall, Inc.
200 Old Tappan Road
Old Tappan, NJ 07675
(201)592-2000

300 pages
\$25 paperback
\$32.95 hardcover

IF, AS A PROGRAMMER, you want to go beyond Basic but not all the way to assembly language, you'll find C a comfortable compromise. It lets you generate object code, which in turn generates assembly language, so you can do anything you'd want to do with assembly language without having to spend all your time dealing with assembly language details.

Learning to Program in C is an arm-chair tutorial that assumes you know about programming and programming theory. It's very thorough, and much of it is beyond the average user. Yet it offers a lot to any programmer by sticking to just a few examples throughout and taking things one step at a time. The book discusses full-fledged C, not any of the particular versions on the market. What you'll need to really put the book to use is a familiarity with the commands your compiler will and will not accept.

Plum begins by telling you how C developed and what makes it unique. Chapters on data, operators, statements and control flow, functions, software development, and pointers and structures follow. Those subjects are so well covered that the book is a great reference work as well as a tutorial. Appendices include a C language reference and a summary of chapters in table form. Helpful hints, the kind you usually have to learn on your own, are scattered throughout, and standard conventions are identified and discussed.

I read the book through before trying to use the language. That gave me a good feel for structure and syntax. Then I re-read the book, using the examples as exercises after modifying them to run on the Color Computer. Almost as much space is devoted to examples as to text. Most Color Computer implementations of C contain all the important C commands; usually it's only the bells and whistles that are missing.

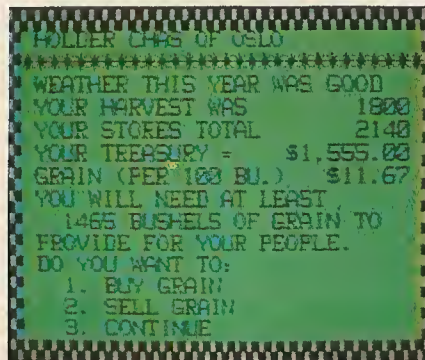
I highly recommend this book to anyone wishing to put C to work. C is a

pleasant programming environment, and reading this patient book is an informative, enlightening experience.

— Norman Garrett

Viking

Prickly Pear Software
9234 East 30th Street
Tucson, AZ 85710
(602)886-1505
16K cassette
\$19.95



IT IS 750 A.D. and you are ruling a small mercantile Viking settlement. If you overcome plagues, revolts, and raiders, you will find yourself years later as the head of a large and prosperous city. If you don't, you can lose it all.

Year by year the grain harvest ranges from bad to great, and people (tax payers) die and are born. If you don't buy enough ferrets to kill the rats you may find your stored grain eaten away by winter's end. You and/or your population may suffer from the plague. You may buy land but fail to spend enough money to train guards, in which case raiders will be victorious. And if your taxes are too high, your people revolt, which results in lost property and, again, a smaller financial return. All these ifs drive home one obvious lesson: invest wisely. Money helps correct past errors.

My 15-year-old son approaches Viking like a wolf to a trapped deer herd. He will starve the people, raise taxes to the hilt, and do anything else he must to increase the treasury. He has won using this strategy. I, an enlightened, compassionate 20th century man, try to keep the common folk happy. I have also won. What this suggests to me is that Viking reflects political and economic reality, and that's no small compliment for a simulation.

Public administration majors will find Viking a refreshing break from their dry,

pragmatic texts. Anyone else with a yen to manage a public will enjoy it, too. Just CLOADM and the program automatically executes for you. It accommodates up to four players and has nine levels of difficulty.

— Thomas Taulli

Option 4

YGS
Box 308
Brechin, Ontario
Canada L0K 1B0
(705)484-5691
32K, printer
\$149.95 disk

OPTION 4 IS A CANADIAN payroll program with automatic Social Insurance Number validation, formatted screens, error trapping, and disk, printer, and archival tape transfers. It provides detailed pay stubs and batched checks, total cost/duty allocations, gross pay reviewing for any period, and a yearly user update. It is one of seven integrated business programs that do everything from cash-watching to job and material costing.

Option 4 is for you if: you do the book-keeping for a Canadian company that employs more than two or three workers; your workers are paid by the hour and on a weekly basis; no separate record of sick leave is required; you have an Epson MX80 printer or one with similar control codes; you have or want pre-printed checks; and you are capable of some simple Basic programming. It's a long list of ifs, but Option 4 is a specialized product.

This program provides constant prompts so there is no chance of unknowingly losing data. Its tape archive system lets you back up your data to cassette. There are screen dumps and print-out options for key information, and there are paycheck and comprehensive stub printing features. There are, however, weaknesses in the program.

The line that lets you sort or view files by check number has a glitch. Line 490 has been deleted without the GOSUB in Line 1050 having been changed. That would be easy enough to do, but the program has been protected. If you have the program and already know how to get into it, changing the GOSUB 490 to GOSUB 510 seems to solve the problem. But the security feature brings up another problem. If you hit the Break key by acci-

An Important Bulletin for Home Computer Users

*This is the only programming system you'll ever need
for your home computer.*

If you own a small home computer, the story we're about to tell you could be of great help. It's about a revolutionary new software programming system that will let you and your entire family take full advantage of that machine you bought. But first things first, so here's a list of the home computers this product was specifically designed for: Atari 400, 600, 800, XL Series; Commodore Pet, VIC 20 and 64; IBM PCjr; TRS-80 color computer; TI-99/4A and the Timex Sinclair 1000, 2048 and 2068. If you own one of these computers, it would be well worth your time to read further.

THE PROBLEM WITH HOME COMPUTERS

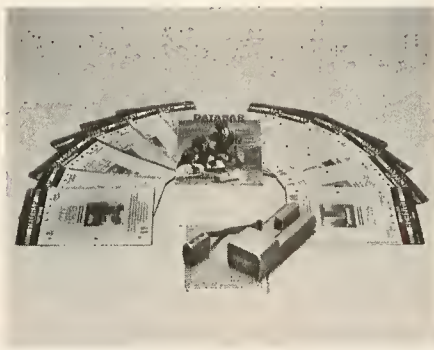
As you probably know, the problem with these small computers is how to get good software into them. Keyboard entry is too time consuming. Diskettes do the job well, but the loaders are expensive and so are the diskettes. Cassette loading is less expensive, but the cassettes themselves still aren't cheap and sometimes a program has to be read again and again before it actually is entered. Furthermore, few of these software manufacturers guarantee their product to run at all.

So unfortunately, a lot of these potentially useful computers are relegated to just game-playing or, even worse, they find their way onto a closet shelf somewhere behind the bowling ball or last year's magazines.

THE SOLUTION IS DATABAR SOFTWARE

Now, thanks to the engineers at Databar Corporation, you can bring your computer back to life. They have developed OSCAR — which stands for an Optical Scanning Reader. What it does is read a bar code program in much the same manner as your local supermarket reads the bar code information on your grocery products. OSCAR plugs directly into your computer, and can read even complex programs extremely fast. In fact, in a recent time test it took a graduate computer programmer 1 hour, 9 minutes and 43 seconds to successfully type-in a program. To enter that same program, it took an eight-year-old child with no computer experience only eight minutes and 17 seconds.

With OSCAR, programming is also inexpensive. The bar code programs read by OSCAR are printed on paper, making the programs inherently a lot less costly to produce than cassette tapes or diskettes. And because the programs cost less to produce, they can be sold to you for significantly less.



But, just because they cost less doesn't mean they aren't of the highest quality. In fact, they are so good and reliable, we are almost alone among software manufacturers to guarantee our product to run as advertised.

Databar Corporation has already developed an extensive library of programs ranging in subject matter from non-violent games to science, health, home management, writing skills and more. These programs are readily available at your local computer store and they retail for under \$10 (about 1/3 what a diskette costs).

THE DATABAR CLUB

But amazingly, you can get great software programs for an unbelievable \$1.25 each — if you choose to join the Databar Club. Every charter member gets 12 monthly issues of the Databar magazine each featuring at least eight great programs. In addition, this

family oriented magazine also features articles on related subjects and computer use in general. The subjects covered by the software include: games, home management, classroom learning, health, law, science, writing skills, and computer programming. What's more, Databar Club members get a three-ring binder for their software programs as well as eligibility for exciting contests.

But whether you join the Databar Club or purchase individual program packages from your favorite retailer — OSCAR can dramatically change the amount and quality of the use you get out of your computer. And let's face it: in the not so distant future much of an individual's competence will be tied up in how well he or she interfaces with a computer.

This trial offer includes OSCAR plus the premier issue of Databar magazine. OSCAR is backed by a full 1-year warranty and if you aren't 100% satisfied with OSCAR, then you can return the unit within 30 days for a full refund.

To order, credit card holders call toll free and ask for OSCAR, or send a check plus \$1.50 for shipping and handling for each unit ordered.

OSCAR with the premier issue of Databar magazine can be yours for only \$79.95. And the premier edition of Databar magazine provides all details necessary for joining the Databar Club. So send for your OSCAR today — and take full advantage of your computer tomorrow.

☐ **Option 1 (\$79.95)†††** OSCAR — a professional quality optical reader for easy programming of your home computer in minutes, plus a trial copy of DATABAR Magazine.

☐ **Option 2 (\$120.00)** Charter Member DATABAR Club 1-year subscription to DATABAR Magazine — with 8 programs every issue.

☐ **Option 3 (\$35.00 Q1)** Same as Option 2 but payable \$35 per quarter.

☐ **Option 4 (\$240.00)†** Charter Member DATABAR Club 2-year subscription to DATABAR Magazine — with a FREE OSCAR, the industry's finest barcode programmer.

☐ **Option 5 (\$10.50)** Trial copy of DATABAR Magazine — chuck-full of barcode programs.

*30-day money-back guarantee. †Add \$1.50 for handling. ††MN residents add 6% sales tax.

Enclosed Check # _____

Money Order # _____

Payable to Databar. Or charge my Am. Ex. ☐ Visa ☐
MasterCard ☐ Carte Blanche ☐ Diners Club ☐

Card # _____

Exp. Date _____

Name _____

Address _____

City _____ State _____ Zip _____

Phone _____

My Computer Model is _____

DATABAR®

Databar Corporation, 10202 Crosstown Circle • Eden Prairie, MN 55344 • Phone Orders: MN (612) 944-5700
Out-of-State: 1 (800) 672-2776

Circle No. 19 on Reader Service Card

Upgrade Your Color Computer With A KeyTronic Keyboard.

Simple to install in your TRS-80 Color Computer*. A high-quality Replacement Keyboard from Key Tronic . . . the world's leading keyboard manufacturer for computer terminals.

FEATURES

- 15-20% higher data input rate compared to standard color computer keyboard.
- User programmable function key.
- Familiar typewriter layout.
- Complete legend description.
- High reliability—keys do not stick or jam.

Additional features include — high spring force on "clear" and "break" keys to prevent entry errors, full sculptured keytop array with low profile keytops, and locating "pips" on home row keys.

ORDERING INFO:

Suggested Retail Price: **\$89.95**, includes plug adapter, part #500c, for models produced after Oct. '82 (Rev F and later). To order Model **KB-500** call Toll Free: **1-800-262-6006** for the retailer closest to you (7am-3pm Pacific Time). Warranty information may be obtained free of charge by writing to the address below.



*Radio Shack is a registered trademark of Tandy Corp.



Come See Us At Comdex Booth #4845 & 4850.

THE RESPONSIVE KEYBOARD COMPANY

Dept. E2 • P.O. Box 14687 • Spokane, Washington 99214 USA

RETAILERS: For the Distributor in your area, call Toll Free 1-800-262-6006 Dept. D (7am-3pm Pacific Time)

Circle No. 70 on Reader Service Card

dent while going about your legitimate business everything you've done up to that point will be lost unless previously saved to disk or tape. Granted, users are amply warned to always save data, but it would have been better to inactivate the Break key.

One other fault is the inability of the program to keep track of sick leave. It does allow the accumulation of extra hours and, in a short week, hours are automatically drawn from this accumulation. This lets sick time be made up from overtime but there is no record of the transaction.

Provincial governments are constantly changing the rules of the paycheck game. If you don't know how to change the provincial calculation formulas you will find yourself again doing the payroll by hand. YGS will do annual upgrades for 30 percent of the program's current retail price, but depending on an outside source may leave you doing the payroll by hand for a long time if the provincial government decided to change the formula in the middle of the year. The manual tells you only how to call up formulas for changing: you must know how to make the changes if you want to save time.

Now for the trivial faults:

Some screen routines seem unnecessarily slow. You have to just sit and watch them.

Once you begin inputting data into a routine, there is no escape; you have to finish all the entries.

If you make a mistake in one field, you have to re-do all fields to correct it. If you are not a good typist, you may find this particularly annoying.

"To correct mistakes you have to re-do all fields. You may find this particularly annoying."

There are two data formats used, one right after the other. In one case you enter a date with slashes between the month, day, and year, and the month is entered as two letters. In the second case you enter the date as one continuous number.

Error messages flash at high speed in lowercase video. They are hard to read

and only stay on briefly. Once you realize what the message is, the prompt makes you wait. A steady prompt that would require pressing the Enter key to clear would be better. In one case a line of a screen scrolled off the top before I could read it. In another case a whole screen was sometimes whisked away before I could see what it was about. The latter problem was intermittent, though.

The program is set up primarily for salaried employees or employees working on an hourly basis and paid weekly. It is much harder to use if you pay your employees less than once a week.

The price is high. Whether this is a trivial fault or not depends on your budget, but \$150 is about as high as Color Computer programs go and this one has not been streamlined and debugged to the point that it should demand top price.

The manual is well-organized and easy to follow, except the index is on page 14 rather than the last page.

YGS will replace an unloadable disk free of charge within 90 days of purchase, and will replace an unloadable or damaged disk within the year of purchase for 10 percent of the current retail price. Getting a new manual or having your password changed costs 15 percent of the current retail price.

EARLY GAMES FOR YOUNG CHILDREN



NINE LEARNING GAMES BY JOHN PAULSON
counterpoint software inc.

**The Best Selling Program for Young Children
Now Available for: TRS-80 Color Computer-
16K disk or cassette and TRS-80 Models
I/III-32K disk or 16K cassette**

Nine fun educational games for children ages 2½ to 6

counterpoint software, inc.
4005 West Sixty-Fifth Street
Minneapolis, Minnesota 55435

Phone Orders: 800-328-1223
Minnesota: 612-926-7888

Educators Endorse: "Early Games can help children learn new concepts, information and skills, and also introduces them to the joys and benefits of home computers."

Peter Clark, Faculty
Institute of Child Development
University of Minnesota

No adult supervision required. The Picture Menu gives children control. They can:

- Match Numbers
- Match Letters
- Count Colorful Blocks
- Learn the Alphabet
- Add Stacks of Blocks
- Spell their Names
- Subtract Stacks of Blocks
- Compare Shapes
- Draw and Save Colorful Pictures

**All
nine games
for \$29.95**

Yes!

Please rush me Early Games for Young Children

Circle one:

Model I Disk Color Computer Disk Model I/III Cassette
Model III Disk Color Computer Cassette

Name

Address

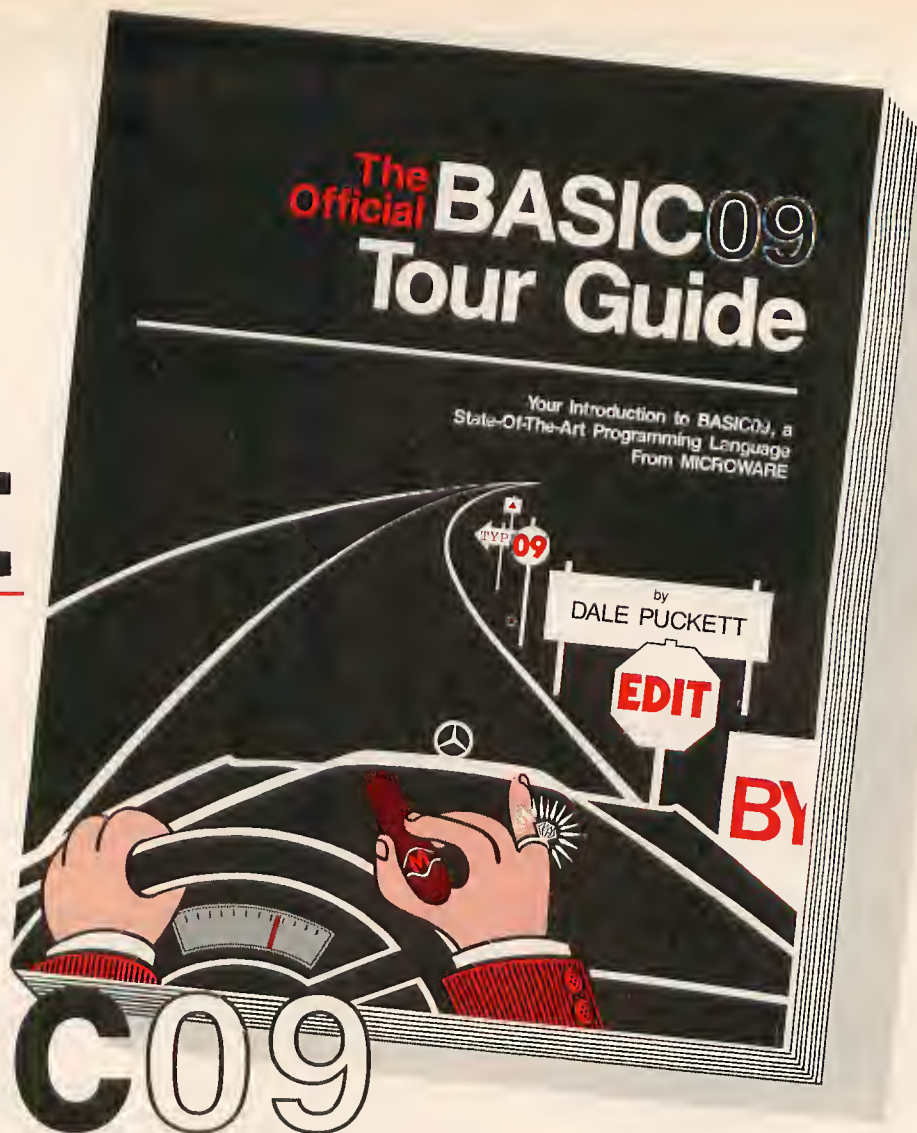
City State Zip

☐ My check for \$29.95 is enclosed (Minnesota residents add 6% sales tax).

☐ Charge to VISA ☐ Charge to Mastercard

Acct. No. Expiration Date

Get the most out of BASIC09



The **OFFICIAL BASIC09 TOUR GUIDE** is skillfully written in a friendly and easy-to-read style. Just perfect for those new to computers and to BASIC09. It's also a *valuable reference book* for programmers, engineers, students and hobbyists, providing an in-depth look at BASIC09 plus an overview of the OS-9 operating system. Comprehensive reference sections on BASIC09 and OS-9 commands are also included.

The book "maps" out your route through the Mercedes of Basics... BASIC09 and puts you in the driver's seat in no time. Fasten your seatbelt, sit back and enjoy the ride to perfecting your programming skills.

microware®

Specialists in system software for 68-family microprocessors since 1977.

OS-9 and BASIC09 are trademarks of Microware and Motorola.

MICROWARE . . .

The **OFFICIAL BASIC09 TOUR GUIDE** comes from the people who wrote BASIC09. As the leader in 6809 system software, we at MICROWARE care about our users and want to help you get the most from our products.

It's Easy to Order.

Phone orders are accepted from MasterCard or VISA cardholders or for COD shipment. You can also order by mail using the coupon below. Quantity discounts are available to educational organizations and dealers. For further information contact Microware.

MICROWARE SYSTEMS CORPORATION
P.O. Box 4865
Des Moines, IA 50304, U.S.A.
Phone (515) 279-8844
Telex 910-520-2535

Please send _____ copies of the **Basic09 Tour Guide** book at \$18.95 each. Add \$2.00 for UPS shipping in the U.S. or \$5.00 for overseas air mail per book. Iowa residents add 4% sales tax.

Name _____

Address _____

City _____

State _____ Zip _____

☐ I have enclosed a check

☐ Charge to my bank card:

MasterCard ☐ VISA ☐

Card Number _____

Expiration _____

Circle No. 87 on Reader Service Card

YGS will also modify the program for your printer at its current hourly rate but again that is something you can do yourself — the manual tells you how to get into the printer-driver program.

Other programs in the YGS line include checks payable, cash journal, mailing, general ledger, pay journal and a time and material costing program. All but the checks payable program cost \$49.95. Checks payable is \$69.95.

—R. Bartley Betts

Test Aid

Infotools
111 Country Club Lane
Oxford, OH 45056
(513)523-8473
32K, 64K
\$18 cassette

T IRED OF SCHLEPPING through the chore of writing tests, teachers? Dissatisfied with the questions on ready-made tests? Then Test Aid could be for you.

Test Aid lets you write, save, edit, format, and print questions. It also prints questions in any order you want, from one or more files. You can write up to 50 questions consisting of over 700 characters per question. The program has automatic word wrap and page breaks, and comes with a concise 15-page instruction booklet, too.

The loading directions have you enter PCLEAR 1 and CLOAD, but don't tell you to remove your disk drive. I tested the cassette version only, which won't operate with a disk in place. An enhanced disk version was due out as this review was being written.

Another minor kink regards typing commands. On the screens commands are in lowercase first letters followed by all uppercase letters. You have to type commands in uppercase only, though.

Test Aid's commands are: Generate New Questions, Print, Edit, Display and Select Questions, Save to Tape, Load from Tape, Renumber Question, Count and Clear, and Heading. When you want to write new questions the screen shows a > about halfway down to let you know how far you can type before you run out of room. The screen doesn't word wrap but the printer does.

After generating a question the screen switches to a formatted screen with four answer spaces. Because no links are skipped between questions, there's no space for answers on tests that require

them. Infotools wrote the program for only one line between questions. Line 2290 in the early version omitted a carriage return message. The fix is to GOTO 2290 and type ,CHR\$(13); just after PRINT\$ -2.

While editing you can scroll with the left and right arrows. A to-be-replaced prompt has you type in what you want changed, then what you want it changed to.

The "display and select question" mode has a nice feature, Test Queue. You pick which questions you want to print with the Shift and Up Arrow keys, which also assigns numerical positions to

these questions. Only questions listed on the queue will be printed.

The Print Out command lets you begin printing at any question number, so you can partially print one file, then load another and keep printing in sequence.

The Renumber command lets you raise or lower a test number by entering how many numbers you want to move it (+4 or -7). Count and Clear shows you how many items are in a file and lets you clear file memory.

The Heading command, of course, lets you write heads. It has no centering ability, though. But with a little time to figure out the necessary spacing you can write

SUPER PRO KEYBOARD*



Great New Price!
Just \$64.95

More Super Pro keyboards have been sold than any other brand for good reason... It is the best looking, best feeling keyboard available anywhere! The best buy for your money. Read what the reviewers have said.

Color Computer News, June '83

Mark Data Products is well known to us "longtimers"... Every bit as finished as if Tandy had done it... The Mark Data Super-Pro is your best buy... The one that is in my CoCo to stay...

Color Computer Magazine, June '83

The installation procedure is well detailed and quite simple... Has a professional feel, reacts well to the touch, has held up to some purposeful pounding...

Hot CoCo, August '83

Like putting leather upholstery in your Volkswagen... Very impressed with the appearance and performance... Could easily pass as original equipment... Installation is very simple...

Rainbow, April '83

A fine piece of hardware from Mark Data Products... It is super and it is professional too... If you are searching for a replacement keyboard, it is an excellent buy...

- Original layout—no unsupported keys.
- No special software required.
- Fast, simple installation—no soldering.
- Individually boxed with full instructions.
- Professional, low profile, finished appearance.
- U.S. made—highest quality, gold contacts.
- Smooth, responsive "Touch Typist" feel.
- Fits all 'D', 'E', and 'F' board models.

*Computers produced after approximately October 1982 require an additional plug adapter. Please add \$4.95



Mark Data Products

24001 ALICIA PKWY., NO. 207 • MISSION VIEJO, CA 92691 • (714) 768-1551

All Orders: Please add \$2.00 shipping and handling in the continental U.S. All others, add air shipping and \$3.00 handling. California residents add 6% sales tax. Foreign orders please remit U.S. funds. Software authors—contact us for exciting program marketing details.

Circle No. 74 on Reader Service Card

directions before a heading.

Test Aid's drawbacks are minor. I feel the program is the result of a serious attempt to take the tedium out of writing tests. If you don't mind doing a little digging beforehand, it will suit your needs nicely.

—Michael Garozzo

Color Demon Seed

Computer Shack
1691 Easton
Pontiac, MI 48054
(313)673-8700

32K

\$27.95 cassette

\$29.95 disk

COLOR DEMON SEED is a challenging, even devious, arcade game. It offers as much firing action as anyone could want, swarms of attacking bats and demons, and an attack ship that tries to crush you.

You start off with five ships and lose one each time you get shot or killed. I found no way to replenish the supply of ships. Your ship is at the bottom of the screen and moves only left and right,

therefore you shoot only upward. The number of ships left and your score are given at the top of the screen.

You fight two waves of bats, then two waves of demons, then the attack ship. That cycle repeats itself. After the second, fourth, and sixth rounds are special challenge stages.

Each wave of bats is over a dozen strong. The bats flit back and forth, then swoop down on the attack. Each bat attacks for about 20 seconds, then flies back to the top of the screen for awhile before attacking again. As many as eight or 10 may attack at once, flying in all directions and crossing each others' paths. Their dirtiest trick is to fly off screen and swoop in low from the side a few seconds later. They can kill by either shooting or crashing into you like little leathery Kamikazees. They can fire one shot or up to half a dozen in rapid succession. Every bat in each wave must die if you are to get to the next.

The demons appear as seeds flying back and forth, seeds that hatch into monstrous, wide-winged, vulture-like creatures. They attack more viciously than the bats, sometimes with several seconds of automatic fire. They also kill at a touch. With both types of waves you get two shots on the screen in the first at-

tack but only one in the second.

If you survive long enough, you face the attack ship, huge and relentlessly sinking toward you. It will crush you if you don't shoot through its underside, which is protected by a rotating shield. Killing the gargoyle pilot inside is most difficult; debris is falling and self-sacrificing bats are diving from both sides. Speed and accuracy with your weapon are crucial if you are to succeed. Sound challenging? You bet, but despite the odds all is not working against you.

You have a shield that, if used wisely, can be a very effective offensive weapon. You can shoot while shielded, and your attackers perish if they collide with the shield. If it's raised just before a multiple attack it can wipe out half a dozen bats at once. The danger in using it too much though, is that you don't control when it's removed, and sometimes you turn vulnerable at just the wrong time.

This game can be played with a joystick or from the keyboard. I found the joystick better because it's hard to simultaneously control ship movement, shooting, and the shield from the keyboard. A pause feature lets you take a break or study the graphics, which are well-done but not outstanding. The game keeps a running list of the 10 highest scores dur-

FREE OFFER!

COMPUTER CASSETTES 58¢

FREE "World Capitals Game Cassette"

with each order of 20 or more C-10's

Specify TRS-80 Color Computer, MC-10, TI-99/4A
VIC-20 or Commodore 64

- C-10 Length
- 5 Screw Shell / Free Labels
- Lifetime money back guarantee
- Storage Box add 12¢ each
- \$2.00 shipping charge - any quantity (Canadian Orders \$6.00 shipping)
- NJ Residents add 6% Sales Tax.
- Send check or money order to:

PARALLEL SYSTEMS

Box 772 - Dept. CC
Blackwood, NJ 08012
609-227-9634

Talk is Cheap!

your Color Computer can talk for only
\$29.95

SPEAK UPI™ is a machine language, voice synthesizer program for the TRS-80 Color Computer.* It is 100% software—nothing else to buy. Best of all, **YOU** can make BASIC programs talk!

- 16K, 32K, 64K all on one cassette
- Text-to-speech makes it easy to use
- **SPEAK UPI** will say anything
- Reviewed in April '83 issue of *Rainbow*
- Reviewed in Oct. '83 *Color Computer*
- COD, VISA, MC, checks—no delay

ORDER NOW 800-334-0854 EXT. 890



Classical Computing, Inc.

P.O. Box 3318
Chapel Hill, NC 27515

*TM by Tandy Corp.

THE COLORSOFT™ BUSINESS SYSTEM

INTEGRATED BUSINESS SOFTWARE DESIGNED FOR THE COLOR COMPUTER
WRITTEN FOR USE BY THE NON-ACCOUNTING ORIENTED BUSINESSMAN
CONCISE USERS MANUAL WITH SAMPLE TRANSACTIONS TUTORIAL
PROFESSIONALLY WRITTEN AND FULLY TESTED
HIGHLY USER FRIENDLY AND MENU DRIVEN
AFTER THE SALE SUPPORT

SMALL BUSINESS ACCOUNTING (Version 2.0) This sales-based accounting package is designed for the non-accounting oriented businessman. It also contains the flexibility for the accounting oriented user to set up a double entry journal with an almost unlimited chart of accounts. This package includes Sales Entry, transaction driven Accounts Receivable and Accounts Payable, Journal Entry, Payroll Disbursement, and Record Maintenance programs. Screen and hardcopy system outputs include Balance Sheet, Income Statement, Customer and Vendor Status Reports, Accounts Receivable and Payable Aging Reports, Check Register, Sales Reports, Account Status Lists, and a Journal Posting List. The number of accounts is limited only by the number of disk drives. \$89.95

ACCOUNTS RECEIVABLE (Version 2.0) This package is designed to meet the requirements of most small business users. The system includes detailed audit trails and history reports for each customer, prepares invoices and monthly statements, mailing labels, aging lists, and an alphabetized customer listing. The user can define net terms for commercial accounts or finance charges for revolving accounts. This package functions as a standalone A/R system or integrates with the Small Business Accounting package to build a complete accounting/receivables system. \$59.95

PAYROLL (Version 2.0) This integratable package is designed for maintaining personnel and payroll data for up to 200 hourly and salaried employees with 8 deductions each. This system calculates payroll and tax amounts, prints checks and maintains year-to-date totals. These amounts can be automatically transferred to the SBA package for financial reporting. It computes each pay period's totals for straight time, overtime, and bonus pay and determines taxes to be withheld. Additional outputs include mailing list, listing of employees, year-to-date federal and/or state tax listing, and a listing of current misc. deductions. This system is suited for use in all states except Oklahoma and Delaware. \$69.95

All programs require a minimum of 32K and 1 disk drive but will take advantage of 64K and multiple drives. Each package features a hi-res 51 x 24 black on green screen. 16K versions available without hi-res screen. Specify 16K or 32K versions when ordering. Future integrated packages will include: Inventory Control, Sales Analysis, Accounts Payable.

INCLUDE \$5.00 Shipping/Handling Per Order

Write for Free Catalog

BRANTEX, INC.

COLOR SOFTWARE SERVICES DIV.

BUSINESS SOFTWARE GROUP
P.O. BOX 1708
GREENVILLE, TEXAS 75401



TELEPHONE ORDERS
(214) 454-3674
COD/VISA/MASTERCARD

ATTENTION DEALERS: WE OFFER THE BEST DEALER PLANS AVAILABLE

SUPER SCREEN



- A big 51 character by 24 line screen.
- Full upper and lower case characters.
- Easily combine text with hi-res graphics.
- PRINT @ is completely functional on the big screen.
- The powerful ON ERROR GOTO is fully implemented.
- Auto-key repeat for greater keyboard convenience.
- Control codes for additional functions.
- Works with 16K, 32K or 64K computers.
- Available on disc or cassette.
- Works with extended and/or disc BASIC.

51 CHARACTERS BY 24 LINE DISPLAY

Super Screen is a powerful, machine language program that significantly upgrades the performance and usefulness of 16K or greater, Extended and Disc Basic Color Computers. The standard Color Computer display screen is totally inadequate for serious, personal or business applications so Super Screen replaces it with a brand new, 51 character wide by 24 line screen including full upper and lower case characters. Instead of a confusing checkerboard appearance, you now have true lower case letters along with a screen that is capable of displaying 1224 characters. The difference is startling! Your computer takes on new dimensions and can easily handle lines of text that were simply too long and complex to display on the old screen.

COMBINE TEXT WITH HI-RES GRAPHICS

You can now write truly professional looking programs that combine text with hi-res graphics. Super Screen allows you to create graphics displays with the Basic LINE, DRAW and CIRCLE statements and then notate the graphics with descriptive text. You can even use PRINT @ if you wish for greater programming convenience. Super Screen's versatility will amaze you.

PRINT @ IS FULLY IMPLEMENTED

The PRINT @ statement is a valuable asset to the programmer when formatting text on the screen. The standard Color Computer will report an error if you specify a location higher than 511 but Super Screen allows locations all the way to 1223! You get a big screen and a powerful formatting tool as well. Of course, Super Screen also supports the CLS command allowing you to clear the big screen using standard Basic syntax.

ON ERROR GOTO

That's right! Super Screen gives you a full implementation of ON ERROR GOTO including the ERR and ERL functions. Now you can trap errors and take corrective action to prevent crashed programs and lost data using the same standard syntax as other computers. The ON ERROR GOTO capability overcomes a serious deficiency of Color Computer Basic and greatly improves your capability to handle sophisticated tasks. All well written, "user friendly" programs use error trapping techniques and yours can too! Now that's power!

AUTO KEY REPEAT

No more frustration as you edit a long line in your Basic program; just hold the space bar down and automatically step to the desired position in the line. Need a line of asterisks? Hold the key down and auto repeat will give them to you. Those of you who spend many hours at your keyboard will appreciate this outstanding addition to Super Screen's long list of impressive capabilities.

CONTROL CODES FOR ADDITIONAL FUNCTIONS

Super Screen recognizes several special control code characters that allow selection of block or underline, solid or blinking cursor and other functions. You can "Home Up" the cursor or you may erase from the cursor to the end of a line or to the end of the screen just like many other computers. These special codes give you an extra dimension of versatility and convenience that put Super Screen in a class by itself.

AND MORE GOOD NEWS...

Super Screen comes with complete, well detailed instructions and is available on cassette or disc. It adjusts automatically to any 16K or greater, Extended or Disc Basic Color Computer or TDP-100 and uses only 2K of memory in addition to the screen memory reserved during power up. Guaranteed to be the most frequently used program in your software library...once you use it, you won't be without it! Super Screen's low price will really please you; only \$29.95 on cassette or \$32.95 on disc!

64K Memory Expansion Kit

All parts and complete instructions

\$64.95

NEW! SUPER BUG



Mark Data Products SUPER BUG is a powerful, relocatable machine code monitor program for your Cocom. If you are a beginner, the program and documentation are an indispensable training aid, helping you to gain a better understanding of your Color Computer and machine code programming. If you are an accomplished computerist, SUPER BUG's capabilities, versatility and convenience will prove invaluable during programming and debugging.

SUPER BUG offers so many outstanding features that we are unable to list them all in this limited space. hex and alpha numeric memory display, modify, search and test; full printer support with baud rate and line feed select; up to 220 breakpoints; mini object code disassembler; 64K mode setup; decimal, hex and ascii code conversion routines and extensive documentation. Only \$29.95 on cassette or \$32.95 on disc.

ORDER ENTRY SYSTEM

The Mark Data Products sales order processing system will give a fast, efficient means to enter orders, print shipping papers and invoices, prepare sales reports, and monitor receivables. The system automatically enhances the monitor screen to a 51 character by 24 line display. 32K of memory is required along with an 80-column printer, and one or more disc drives.

The MDP order entry system is a family of programs which operate interactively by means of a "menu" selection scheme. Up to 900 products may be defined and a single disc system can hold over 600 transactions. When the operator selects a task to be performed, the computer loads a program designed to handle that task from the system disc. The system disc contains all of the programs required to create, update and maintain data files and prepare the necessary paperwork including shipping and invoice forms, daily sales reports, a monthly (or other period) sales report and a receivables report.

The MDP system:

- Is accurate, user friendly and simple to use.
- Is easy to customize for specific user requirements.
- Produces a traceable invoice.
- Handles receivables as well as closed orders.
- Is capable of future expandability.

This accounting software equals or exceeds higher priced packages for other computers and includes a detailed operating manual. For just \$99.95.

ACCOUNTING SYSTEM

The Mark Data Products accounting system is ideal for the small businessman needing a fast, efficient means to process income and expenses, prepare detailed reports and maintain most of the information required at tax time. The system is a family of programs which operate by means of a "menu" selection scheme. When the operator selects a task to perform, the computer loads a program designed to handle that task from the system disc. The system disc contains all of the programs required to create, update and maintain data files and prepare the necessary accounting reports including a transaction journal, a P&L or income report, an interim or trial balance and a balance sheet.

Up to 255 separate accounts may be defined and a single disc system can hold over 1,400 transactions. This system automatically enhances the monitor screen to a 51 character by 24 line display. 32K of memory is required along with an 80-column printer and one or more disc drives.

The MDP system:

- Is accurate, user friendly and simple to use.
- Is easy to customize for specific user requirements.
- Immediately updates the chart of accounts.
- Provides an audit trail.
- Includes end of period procedures.
- Is capable of future expandability.

This order entry software equals or exceeds higher priced packages for other computers and includes a detailed operating manual. For just \$99.95.

IMPORTANT NEW BOOKS

"Your Color Computer" by Doug Mosher. Over 300 pages of detailed information—A CoCo encyclopedia \$16.95.

"Programming the 6809" by Rodney Zaks and William Labiak. One of the best 6809 machine language texts available—required reference material. \$15.95.

WE STOCK SOFTLAW PRODUCTS

The VIP WRITER Text Processor is rated tops by Rainbow, Hot CoCo and Color Computer Magazine. After evaluation we rate it tops too. Disc \$59.95.



Mark Data Products

24001 ALICIA PKWY., NO. 207 • MISSION VIEJO, CA 92691 • (714) 768-1551

All Orders: Please add \$2.00 shipping and handling in the continental U.S. All others, add air shipping and \$3.00 handling. California residents add 6% sales tax. Foreign orders please remit U.S. funds. Software authors—Contact us for exciting program marketing details. We accept MasterCard and VISA. Distributed in Canada by Kelly Software

ing any one playing session.

Color Demon Seed is written in assembly language with artifactual PMODE 4 color mode (blue, red, and buff on a white background). Its bizarre sounds add to the effect of being attacked by extraterrestrials. The game slows markedly when demons fire multiple shots, but that gives neither side any advantage. This game will put your hand-eye coordination to the acid test.

—Raymond Mosteller

The Color Connection

Computerware
Box 668
Encinitas, CA 92024
(619)436-3512
16K
\$29.95 cassette
\$39.95 disk

THE COLOR CONNECTION, a terminal program, lets you access on-line databases, bulletin boards, and electronic mail.

There are two versions on both tape and disk. One works with the standard 32-character, 16-line configuration. The other generates true upper- and lower-case on 51-character lines and 24 lines per screen and leaves 18,158 bytes free in a 32K computer.

With the Color Connection, you can change and load set-up files, go to terminal mode, and use the free spare in your computer as a buffer.

A set-up file lets you determine and save communications protocol. You can set word length (seven or eight bits), line feeds, parity, duplex, word wrap, inverse or normal screen, upload and download parameters, and, if you have an autodial modem, phone numbers.

The program also lets you configure up to four macros, or programmed function keys. You might want to define log-on or log-off command sequences as macros. One thing you can't change is baud. The Color Connection operates at 300 baud only.

After you've set up a file you move into the terminal mode. In this mode, key sequences let you open and close the buffer, erase its contents, use autodial, transmit macros, and transmit the contents of your buffer. These commands let you upload or download files or simply

communicate with another computer.

You can also view the buffer, send it to tape or disk, load files to it, and input to it from the keyboard. Sending the buffer to tape or disk lets you download and store files. Entering terminal mode lets you put a file in the buffer for uploading.

I tested the cassette version only of this program. It worked in a straightforward manner and without flaws. Saving to tape was easy and reliable. The 14-page instruction booklet is clear, concise, and contains all the information you'll need.

—Norman Garrett

Decision Maker

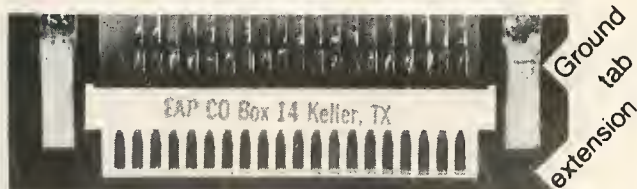
Armadillo Int'l Software
Box 7661
Austin, TX 78712
(512)835-1088
32K, Extended Basic
\$24.95 cassette

IS IT TIME TO SELL the farm? Choose a new heir? Leave your job for another? Is it a good idea to buy more influence in that troubled colony? Well, maybe, maybe not.

TRS-80+ MOD I, III, COCO, TI99/4a
TIMEX 1000, OSBORNE, others

GOLD PLUG - 80

Eliminate disk reboots and data loss due to oxidized contacts at the card edge connectors. **GOLD PLUG 80** solders to the board edge connector. Use your existing cables. (if gold plated)



COCO Disk Module (2)	\$16.95
Ground tab extensions	INCL
Disk Drives (all R.S.)	\$7.95
Gold Disk Cable 2 Drive	29.95
Four Drive Cable	39.95

USA shipping \$1.45 Can/Mex \$4.
Foreign \$7. Don't wait any longer TEXAS 5% TAX

Available at your favorite dealer or order direct from



E.A.P. CO.
P.O. BOX 14

KELLER, TEXAS 76248

(817) 498-4242

+ trademark Tandy Corp

MC/VISA

YORK 10[®]

CASSETTES

COMPUTER GRADE

• DATA TRAC •

BLANK CASSETTES

C-05, C-06, C-10, C-12, C-20, C-24, C-32

From the leading supplier of Computer Cassettes, new, longer length C-12's (6 minutes per side) provide the extra few feet needed for some 16K programs.

- BASF-LHD (DPS) world standard tape.
- Premium 5 screw shell with leader.
- Internationally acclaimed. Thousands of repeat users.
- Error Free • Money back guarantee.

BUY THE BEST, AT FACTORY-DIRECT PRICES

* 500 C-12's or C-10's — 38¢ each w/labels, add 4¢ • Shipping \$17/500
500 Boxes 13¢ ea • Shipping \$10/500
(Free Caddy offer does not apply)

TRACTOR FEED • DIE-CUT
WHITE: \$3.00/100 \$20.00/1000
COLORED LABELS • Pastels • NEW
Red, Blue, Green, Yellow, Lavender
\$4.00/100 \$30.00/1000

CASSETTE STORAGE CADDY
Holds 12 cassettes \$2.95
w/o boxes.
Includes edge labels and index card

FREE
1 CADDY WITH EVERY
4000 CASSETTES PURCHASED
(does not apply to 500 quantity offer)

Call: 818/700-0330
FOR IMMEDIATE DELIVERY
on Credit Card Orders.

ORDER NOW... MAIL TO —
YORK 10 9525 Vassar Ave. #C2
Chatsworth, CA 91311

ORDER FORM

ITEM	1 DOZEN	2 DOZEN	TOTAL
C-05	<input type="checkbox"/> 7.00	<input type="checkbox"/> 13.00	
C-06	<input type="checkbox"/> 7.00	<input type="checkbox"/> 13.00	
C-10	<input type="checkbox"/> 7.50	<input type="checkbox"/> 14.00	
C-12	<input type="checkbox"/> 7.50	<input type="checkbox"/> 14.00	
C-20	<input type="checkbox"/> 8.75	<input type="checkbox"/> 16.50	
C-24	<input type="checkbox"/> 9.00	<input type="checkbox"/> 17.00	
C-32	<input type="checkbox"/> 11.00	<input type="checkbox"/> 21.00	
Hard Box	<input type="checkbox"/> 2.50	<input type="checkbox"/> 4.00	
Whit. Labels	<input type="checkbox"/> 3.00/100	<input type="checkbox"/> 20.00/1000	
Color Labels	<input type="checkbox"/> 4.00/100	<input type="checkbox"/> 30.00/1000	
Color			
Storage Caddy @ 2.95 ea Qty			
SUB TOTAL			
Calif. residents add sales tax			
Shipping/handling			3.50
Outside 48 Continental States — Additional \$1 per caddy, per doz. cassettes or boxes			
TOTAL			

Each cassette includes 2 labels only. Boxes sold separately. In Continental U.S. shipment by U.P.S. If Parcel Post preferred, check here. ☐

Check or M.O. enclosed ☐ Send Quantity Discounts ☐

Charge to credit card: VISA ☐ MASTERCARD ☐

Card No. _____ Exp. _____

Name _____

Address _____

City _____ State/Zip _____

Signature _____ Phone _____

Ask about our **DUPLICATING SERVICE**

SUPER DISK UTILITY

THE COMPLETE DISK UTILITY.

- A COMPLETE DISK ZAP.
- COMPLETE MASTER DIRECTORY HOLDS SEVERAL THOUSAND FILES.
- MODIFY ANY SECTOR.
- FUNCTION TO NAME THE DISK.
- FORMAT ANY TRACK.
- EVERYTHING A DISK UTILITY CAN BE !!!!
- VERIFY DISK FOR ERRORS.
- MULTIPLE DRIVE COMPATIBLE.
- BACKUP DISK IN 1 PASS.
- COPY BY FILE BACKUP.

FOR ANY COCO/TDP WITH 32K MINIMUM AND A DISK DRIVE. **ONLY \$39.95**

DSL'S GREATEST HITS

- GODFATHER THEME
- ESCAPE
- GEO STUDIES (5 STUDIES)
- ML RABBIT
- TUBECUBE
- WORD CC 7
- BUG CHASE
- SPELLER
- PACKMAZE
- AUTO LINE
- HARD COPY
- POKING AROUND
- CLOSE TO YOU
- MIMIC
- COCO SAFARI
- SO-I-SEZ

ALL 20 PROGRAMS
\$19.95 TAPE \$29.95 DISK

GAMES

CANDY CO.	34.95 (C/D)
TRAPFALL	27.95 (C)
AIR TRAFFIC	
CONTROLLER	28.95 (C)
GRABBER	27.95 (C)
WORLDS OF FLIGHT	29.95 (C)
DEVIL ASSAULT	27.95 (C)
BUZZARD BAIT	27.95 (C)
THE KING	26.95 (C)
DOODLEBUG	24.95 (C)
DEATH PLANET	
ADVENTURE	19.95 (C)
ROBOTTACK	24.94 (C)
THE FROG	30.95 (D) 27.95 (C)
COLORPEDE	29.95 (C)
BIRD ATTACK	21.95 (C)
STELLAR SEARCH	24.95 (C)
STELLAR SEARCH	27.95 (D)
AIRLINE	24.95 (C)
STORM	24.95 (C)
INATAK	24.95
CASHMAN	27.95 (C)
OUTHOUSE	27.95 (C)
AREX	34.95 (C)
ZAXXON	39.95 (C)
MOON SHUTTLE	29.95 (C/D)
CHOPPER STRIKE	27.95 (C)
DEMON SEED	27.95 (C)
ELEC•TRON	24.95 (C)
WORLD OF FLIGHT	32.95 (D) 29.95 (C)
BLOC HEAD	26.95 (C)
HYPER ZONE	26.95 (C)
JUNIORS REVENGE	28.95 (C)
BUMPERS	24.95 (C)

HARDWARE

ANSWER MODEM	
MARK VII	159.00
SATURN LOWER CASE	59.95
VIDEO PLUS	24.95
MODEM I	88.00
CASSETTE RECORDER	49.95
GEMNI 10X	299.00
DELUXE JOYSTICKS	39.95
DISK DRIVE 0	349.00
DISK DRIVE 1,2, OR 3	249.00
USI COLOR MONITOR	275.00
GREEN OR	
AMBER MONITOR	99.00
VIDEO CLEAR	14.95

UTILITIES

PRINTER SPOOLER 64K	9.95
COLOR GRAPHIC	
EDITOR	19.95 (C)
SUPER SCREEN	29.95 (C)
GRAPHIC SCREEN PRINT	
EPSON	9.95 (C)
OKIDATA	9.95 (C)
GEMINI	9.95 (C)
PROWRITER	9.95 (C)
LP VII/RS	7.95 (C)
EDTASM*	49.95 (R)
TAPE DIRECTORY	14.95 (C)
TAPE TO DISK	17.95 (C)
DISK TO TAPE	19.95 (C)

APPLICATION

SPECTRUM VOICE PAK	69.95
TALKING TERM	39.95
SCORE-EZ	
(REQUIRES VOICE PAK)	24.95 (C)
TALKING	
FOREIGN LANGUAGE	24.95 (C)
ELITE-FILE	74..50
VIP WRITER	59.95
VIP DATABASE	59.95
VIP SPELLER	39.95
VIP TERMINAL	49.95
VIP DISK ZAP	39.95
SPELL N FIX	59.29
DISK MAILER	24.95
TELEWRITER	TAPE 49.95
TELEWRITER	DISK 59.95
ELITE-WORD	59.95
ELITE CALC	59.95
ELITE-CALC	59.95
VIP CALC	59.95
ULTRA-CONTESTOR	39.95 (C)
COLOR FINANCE	59.95 (D)

HI - RES ADVENTURES

SHENANIGANS	24.94
CALIXTO ISLAND	24.95
BLACK SANCTUM	24.95
TOUCHSTONE	27.95
TIME BANDIT	27.95
KING TUT	29.95
SEA QUEST	24.95

ACCESSORIES

EPSON RIBBONS	7.49
GEMINI RIBBONS	2.95
DISK MAILERS	.95
10 PACK	8.95
LP VII, DMP100 RIBBONS	4.95
DISKS	
SENTENIAL SS/SD	19.95
SENTENIAL SS/DD	22.95
VERBATIM	34.95
GRAND SLAM 64K KIT	75.00
16-32K RAM SLAM	49.95
2 WAYRS 232 SWITCHER	29.95
3 WAYRS 232 SWITCHER	39.95
COCO REPLACEMENT	
KEYBOARD	39.00
CASSETTE CABLE	5.95
64K RAM EMBLEM	2.95
BOTEK INTERFACE	59.95
FOR EPSON	69.95
HJL-57 KEYBOARD	79.95
MARK DATA KEYBOARD	69.95

\$9.95 RACK

BUSTOUT (R)	
PROJECT NEBULA (R)	
PERSONAL FINANCE (R)	
POLARIS (R)	
SPACE ASSAULT (R)	
SHOOTING GALLERY (R)	
MICROBES (R)	
DEATH TRAP (C)	
COLOR CATAPILLER (C)	
TYPING TEACHER (C)	
COLOR GRAPHICS (C)	
LOGICAL DISK COPY	
DATA BASE (TAPE OR DISK)	

HALF-OFF RACK

ASTRO BLAST	12.50
DOODLE BUG	12.50 (C)
SPACE RAIDERS	12.50
STARBLASTER	19.95
HAPPY HURDLER	6.50
STORM	12.50
LIMITED QUANTITIES	

DSL COMPUTER PRODUCTS INC.

313-582-8930 313-582-3406 (Data)

P.O. BOX 1176 DEARBORN, MI 48121

Michigan Residents Add 4% Sales Tax to Order. Please include \$2.00 for S. & H.



Decision Maker is an aid to sorting out pros and cons. First you make a list of choices, then a list of criteria to consider when evaluating those choices. Each criterion can be given a numeric ranking to indicate its importance.

If I were facing a decision about buying a new car, I might narrow my choices down to a Chevy, a Ford and a Dodge. I have to decide what criteria will influence my choice. Comfort, economy, reliability and cost are my main concerns, so I rank each car accordingly. The program then takes the points assigned and comes up with a "best choice." It is a tool for seeing facts differently than you might otherwise look at them. It will *not* say what is right or wrong.

You can enter 10 choices with up to 39 points for or against each option. With that capacity you should be able to describe most situations.

The package I received consists of a five minute tape and a 16-page instruction booklet. A sample problem shows the computer's display and some responses, program operations, format of expected responses, and program limitations. Decision Maker can be saved to disk.

The documentation doesn't say how to load the program, but a simple CLOAD

will do. You don't need to PCLEAR anything. The documentation says Decision Maker is for 32K, but you can use it in 16K (no disk here) by typing POKE 25,6:NEW before CLOADING. The total memory used is just over 13K.

There are errors in the documentation. The first prompt requests a description of the decision to be made in 31 characters or less. Actually only 30 characters are

*"The next bug
is to your advantage;
I was able to enter
40 points after modification."*

accepted. Enter the thirty-first and you'll be told the line is too long. You will then have to retype the entire line.

The next "bug" is to your advantage. The documentation says you are limited to 39 points for and against. I was able to enter 40, after modifying the program. As written, the program doesn't clear sufficient string space to enter more

than eight points for and against. The cure is easy. Edit Line 90 and change the CLEAR 500 to CLEAR 1500.

The best way to master the program is to read through the instructions, load it and type in the sample problem. After using Decision Maker once or twice you should be able to file the instructions away and forget about them.

The program is well written and seems idiot proof. All entries are checked for type and limits. If you enter a number outside the stated range a tone sounds and you are told what you did wrong. Decision Maker also chides you if you try to enter anything other than numbers when numbers are expected.

The program permits editing on the current line using the arrow keys. Once a line is entered, editing is restricted to an edit screen at the end of each segment of the program. Just enter the number of the line you need to modify. The cursor moves to that line and you retype it. Typing a space then hitting the Enter key deletes the item. Once you indicate that you are finished with a particular segment, you can't go back. Make sure you make all corrections as you go. Unfortunately, you have to keep track, with pencil and paper, of the entries on each screen. Those entries are limited to 11

NEED AN INEXPENSIVE SERIAL-PARALLEL INTERFACE?

SP-2 INTERFACE for EPSON PRINTERS:

- 300-19,200 BAUD rates
- Fits inside printer — No AC Plugs
- Optional external switch (\$5⁰⁰ extra) frees parallel port for use with other computers
- \$49⁹⁵ (plus \$2⁰⁰ shipping)

SP-3 INTERFACE for MOST OTHER PRINTERS:

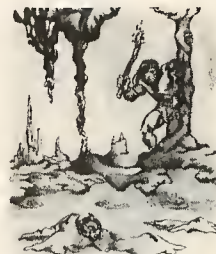
- 300-19,200 BAUD rates
- External to printer — No AC Plugs
- Built in modem/printer switch—no need for Y-cables or plugging/unplugging cables
- \$64⁹⁵ (plus \$2⁰⁰ shipping)

**C
N
R**

P.O. Box 492
Piscataway, NJ 08854
(201) 752-0144
ENGINEERING

DEALER INQUIRIES INVITED!

Circle No. 32 on Reader Service Card



THE RING ADVENTURE

Ancient Evil threatens your homeland. For the long dormant Magna-Kan—last of the evil high Clerics—drawing incalculable power from an old Elven ring, has animated an almost indestructible army of skeletons. Only you can stop the ancient Cleric by undertaking the perilous quest to find and carry the ring to the mysterious ledge of fire, there to be permanently destroyed.

\$19.95 tape—Note: this is a text adventure

CORPORATION

If you've ever wanted to run a large corporation, this is your chance. You start with a small bank account and no other assets, but by making smart investments, and sending out spies, you can become a very powerful person. Secretly learn, from your spies, how other players are investing, then you can flood the market with that investment and financially ruin your opponents. But watch out, you must continually check for spies in your organization or YOU may be ruined. With 3 or more players you can secretly send messages to others in order to pool your resources and bankrupt another player. Every game turns out differently. You won't want to miss this one! For 2 to 5 players.

\$21.95 tape

Personal Cheques and Money Orders welcome. Include \$2.50 shipping per order. All prices in Canadian dollars. B.C. residents add 7% sales tax. All orders shipped within 48 hours. Quantity discounts to dealers. U.S. orders very welcome.

Send order to: **COLORTECH SOFTWARE**

2016 East 13th Avenue
Vancouver, B.C.
Canada V5N 2C4

Programs require 16K extended BASIC

Circle No. 153 on Reader Service Card



TOM MIX SOFTWARE

TELEX
706139

• FOR THE COLOR COMPUTER & TDP 100 • 4285 Bradford N.E., Grand Rapids, MI 49506 (616) 957-0444 •

CU*BER

32K Mach. Lang.
\$27.95 TAPE
\$30.95 DISK



Approaches the excitement and challenges of any Video Arcade. The hazards of CU*BER are many. Help CU*BER change the colors on the pyramid while avoiding many of the dangers always present. Vipers, the Nurd, the Dork, bonus points all add up to another exciting release from Tom Mix Software.



Look out for the GOOGLES!
GRABBER
Arcade Action. Method of play you are the Grabber. The object is to grab the 8 treasures and store them in the center boxes. You start with 3 Grabbers and get extra ones at 20,000 points. Watch out for the googlies! Super high resolution graphics.

16K Machine Language
\$27.95 TAPE \$30.95 DISK



AIR TRAFFIC CONTROLLER

32K Ext. Basic
\$28.95 TAPE
\$31.95 DISK

Air Traffic Controller is a computer model of an air traffic control situation in which Remotely Piloted Vehicles (RPV's) are operated by the controller in landing on and taking off from designated runways.



DEVIL ASSAULT
16K Machine Language
\$27.95 TAPE
\$30.95 DISK

Devil Assault is a multi-level multi-screen game in which bird-like creatures, robots and the devil himself assault your home base which you must defend.

BUZZARD BAIT

By RUGBY CIRCLE
16K Machine Language

\$27.95 Tape \$30.95 Disk

We've done it again! You thought the King was great? wait 'till you see this!! Outstanding high resolution graphics, tremendous sound make this "Joust" type game a must for your software collection. As you fly from cloud to cloud you will enjoy sky high excitement dealing with the challenges presented to you by this newest release by Tom Mix Software.



JOURNEY TO MT. DOOM

32K Mach. Lang.
\$27.95 DISK ONLY

The Necromancer is about to wage war on earth. He needs his lost gold ring to acquire the power to do so. You must find the ring, take it to Mt. Doom and destroy it in the flames from which it came, thus eliminating the Necromancer's evil powers.



"THE FROG"

ARCADE ACTION
This one will give you hours of exciting play... Cross the busy highway to the safety of the median and rest awhile before you set out across the swollen river teaming with hidden hazards. Outstanding sound and graphics.



16K MACHINE LANGUAGE
\$27.95 TAPE
\$30.95 DISK

JUNIOR'S REVENGE

Climb vines, avoid obstacles & creatures to save your father from Luigi.

32K CASS \$28.95
32K DISK \$31.95



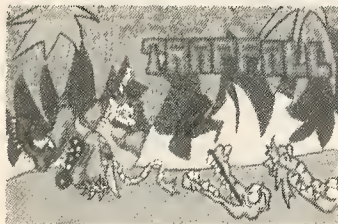
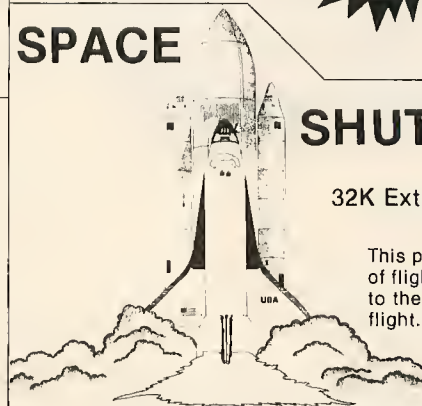
SPACE

SHUTTLE

32K Ext. Basic

\$28.95 TAPE
\$31.95 DISK

This program gives you the real feeling of flight. Full instrumentation complete to the max. Actual simulation of space flight. 32K Extended Basic



"TRAPFALL"

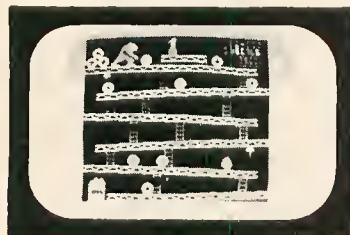
By KEN KALISH

ARCADE ACTION
The "Pitfalls" in this game are many. Hidden treasures, jump over the pits, swing on the vine, watch out for alligators, beware of the scorpion. Another game for the Color Computer with the same high resolution graphics as "The King."

16K MACHINE LANGUAGE
TAPE \$27.95
DISK \$30.95

THE KING

32K Machine Language
\$26.95 TAPE
\$29.95 DISK



ARCADE ACTION - How high can you climb? Four full graphic screens. Exciting Sound - Realistic graphics. Never before has the color computer seen a game like this. Early reviews say: Just like the arcade Simply outstanding!

OTHER GREAT GAMES

PROTECTOR - Exciting fast paced arcade game that looks and plays like the popular arcade game "DEFENDER".

32K Machine Code Tape \$24.95 Disk \$27.95

COLOR GOLF - Now sit at your computer and play nine or eighteen holes. Outstanding graphics in the fairway or on the green. Helps your game. 32K Extended Basic \$17.95

"YAAZEE" (C) 1983 - Yaazee is a 2 player game using five dice to get the best poker hand. After game is loaded flashing digit below player number determines which player rolls dice at the start of the game. 16K Machine Language Ext. Basic \$19.95

BIRD ATTACK - A fast paced machine language arcade game. Shoot the birdmen before they descend upon you. Watch out for their bombs! 16K Machine Language \$21.95

MAZE RACE - Maze race is a one or two player game. Play either against the built in timer or against your favorite opponent. 16K Machine Code \$17.95



ADD \$1.00 POSTAGE & HANDLING • TOP ROYALTIES PAID
MICHIGAN RESIDENTS ADD 4% SALES TAX • LOOKING FOR NEW SOFTWARE

per screen, and you can not return to previous screens.

The program concludes by displaying what choice received the most points, and then displays the options in the order you listed them. This screen should list choices by point value instead! The ability to re-enter the program and make changes after seeing the final screen would make the program both easier to use, and used more often.

"No one has yet written software capable of making decisions; but it's fun."

This is a pretty good program. Despite its name, however, no one has yet written Color Computer software capable of actually making decisions, and Armadillo knows it. But it's fun. Now, about that week off... should we go helicopter skiing in Alaska, diving in the Caribbean, or weed the lawn?

—Gary W. Clemens

Color Tutor

Elite Software
Box 11224
Pittsburgh, PA 15238
(412)795-8492
16K
\$19.95 cassette
\$22.95 disk

COLOR TUTOR is an electronic pedagogue, a tutoring program that accepts up to 50 brief questions and answers. Each entry can be 32 characters long on a 32K machine or 64 characters long on a 64K machine. The program asks questions at random and keeps track of whether answers are right or wrong.

One noteworthy feature is its optional correct spelling mode. If you want, the program will insist on correct spelling; just type YES. Typing NO sets the tutor up to indicate that a correct answer's been given even if spelling is wrong; the only hitch is that the first three letters of the answer have to be spelled right. This feature is handy when you're more concerned with correct answers than proper spellings.

Unlike its ancient Greek predecessors,

one thing this pedagogue can't do is keep its students on the straight and narrow. But it knows they're liable to succumb to a sneaky streak on occasion. For instance, they might try and read the questions on the sly, or even write their own answers into the program. So it has a password. No one can get into the edit mode without the password. And if the password is discovered, it can always be changed.

The program automatically assigns numbers and question marks. Editing is a simple matter of retyping entire questions or answers. The program saves questions until you exit, when they are erased. Instructions are straightforward and come on a single, heavy-duty piece of paper strong enough for your file cabinet.

I think the program is a good, dependable one. But there are two things I don't like. I prefer two chances to answer a question before being given the correct answer. Color Tutor allows only one. And if you type in a wrong answer the screen says NO!!!IT IS: whatever the answer is. That, for my taste, is too blunt. I feel like the computer is yelling at me. I'd prefer a NICE TRY BUT THE ANSWER IS message, or something along that line.

—Michael F. Garozzo

I HAVE SOMETHING TO SAY!

For as little as 46 cents a program you can enjoy great games like **FROGJUMP**, **FRENZY**, **CATERPILLAR CAVE**, **SHOOTIN' GALLERY**, and great adventures. Use powerful home management programs such as **BUDGET**, **STOCK MARKET**, **BARTENDER**, **TINY CALC**, and **COST OF LIVING**. Also, enjoy the use of powerful programming utilities such as **COCO MONITOR**, **GRAPHIC SCREEN PRINT**, **RAM TEST**, **HIGH RESOLUTION TEXT**, and **SINGLE DISK COPY**. Increase your knowledge with educational programs such as **BASIC SPEED UP TUTORIAL**, **FLASH CARD**, **TRIGONOMETRY TUTOR**, and our **8 PART SERIES ON MACHINE LANGUAGE**.

Many programs use machine language!



Every month you will receive a cassette tape with 10 ready to run documented programs.

16K Extended Required

ORDERS SENT SAME DAY!
FIRST CLASS SHIPPING!

Back Issues Available from
July, 1982
Call or write for our free catalog.
Dealer Inquiries Invited.

PRICES		
1 YR (12 ISSUES)		\$55.00
6 MO (6 ISSUES)		\$30.00
SINGLE COPIES		\$ 6.00

MICHIGAN RESIDENTS ADD 4% TO ORDER
OVERSEAS ADD \$10.00 TO SUBSCRIPTION
AND \$1.00 TO SINGLE COPIES

PERSONAL CHECKS WELCOME!

ITEM	PRICE	QUANT	TOTAL
C-10	\$9		
C-20	\$9		
C-60	\$5		
C-90	\$9		
Quotations and \$3.00			
USA funds only			
Subtotal			3.00
Shipping			
Mich. Res.	4%		
TOTAL			

Name _____
Address _____
City _____ St _____ Zip _____
Credit Card _____ Exp _____

★ ★ ★ FREE PROGRAMS ★ ★ ★
FOR EACH ORDER OF 20 OR MORE TAPES YOU WILL RECEIVE
TWO COLOR COMPUTER PROGRAMS OF THE ABOVE PRODUCT



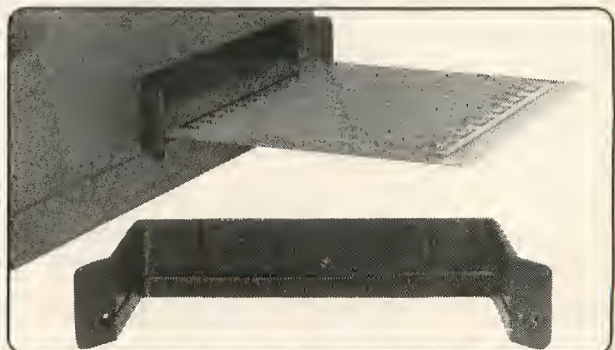
★ 5 SCREW SHELL
★ FREE LABELS
★ ERROR FREE TAPE
★ IMMEDIATE SHIPPING

COMPUTER CASSETTES

T&D Computer Products
P.O. Box 256-C
Holland, MI 49423
(616)396-7577



6809 SYSTEM DEVELOPMENT



EXPANSION HARDWARE FOR THE TRS-80 COLOR COMPUTER

XPNDR1™

SuperGuide™

CoCo Expander Card

Gold edge connector plugs into the CoCo cartridge connector. Signals are labeled on the bottom (wire side) with ground and power buses; plated through holes. The 4.3 x 6.2 inch glass/epoxy card is drilled for ICs and components. The finest bare breadboard for your CoCo. Includes 8 page **Application Notes** to help you get started.

Precision molded plastic insert designed specifically to align and support printed circuit cards in the CoCo cartridge slot; an unbreakable removable card guide. Patent Pending.

\$3.95 each

Available now from:

ROBOTIC MICROSYSTEMS

\$19.95 each or 2 for \$36

BOX 30807 SEATTLE, WA 98103

Circle No. 64 on Reader Service Card

Circle No. 145 on Reader Service Card

COLOR COMPUTER SOFTWARE

SUPER SLEUTH DISASSEMBLER EACH \$99-FLEX, \$101-OS/9
interactively generates source on disk with labels, includes
xref
specify 680x/6502 version or Z-80/8080/85 version
(OBJECT ONLY) EACH \$50-FLEX & OS/9, \$49-COCO DOS
COCO DOS available in 680x/6502 version only

CROSS-ASSEMBLERS EACH \$50-FLEX, \$55-OS/9, ALL \$100
specify for 6800/1, 6502, 6805, Z-80, or 8080/48/85
OS/9 version requires Microware RMA or FHL OSM macro
assembler
FLEX version requires TSC ASMB or FHL ASM or OSM
macro assembler

DEBUGGING SIMULATORS EACH \$75-FLEX, \$100-OS/9
specify 6800/1, 6805/146805, 6502, or (6809 OS/9 only)

6502 TO 6809 ASSEMBLER TRANSLATOR \$75-FLEX, \$85-OS/9
translates 6502 programs to 6809, noting inexact conversions

6800 TO 6809 & 6809 PIC TRANSLATORS \$50-FLEX, \$75-OS/9
translates 6800 programs to 6809, 6809 programs to PIC

FULL-SCREEN FLEX TSC X BASIC PROGRAMS
(with complete cursor control)

DISPLAY GENERATOR/DOCUMENTOR \$50
MAILING LIST SYSTEM \$100
INVENTORY WITH MRP \$100
TABULA RASA SPREADSHEET \$100

DISK UTILITY PROGRAM LIBRARY \$50-FLEX
edit disk sectors, sort directory, maintain master catalog,
etc.

C MODEM TELECOMMUNICATIONS PROGRAM
\$50-FLEX & OS/9
menu-driven with terminal mode, file xfer, MODEM7
protocol, etc.

5.25" SOFT-SECTORED DISKETTES EACH 50 \$75-SSDD,
\$85-DSDO
with Tyvek jackets, hub rings, labels

Computer Systems Consultants, Inc.
1454 Latta Lane, Conyers, GA 30207
Telephone Number 404-483-1717/4570

Specify Color Computer or other version of programs.
Programs provided in source form on diskette: specify O.S.
Call or write for full catalog and dealer info.

VISA and MASTER CARD accepted; US funds only.
Add 5% for shipping software, but not for diskettes.

FLEX trademark of Technical Systems Consultants. OS/9 trademark of Microware.

Circle No. 38 on Reader Service Card

POKES, PEEKS 'N EXECS

Here is the exhaustive file YOU HAVE BEEN WAITING
FOR! Contains OVER 150 Pokes, Peeks & Execs with full
explanation on use for each. BREAK-KEY disable, Reset
Disables, LIST, LLIST & DIR disables. Commands for
Cassette, Disk & Printer and MUCH MUCH MORE!
Tape-To-Disk copy program ONLY \$8.00

HIDE-A-BASIC

A perfect utility to protect your basic programs with 4 ML
routines to disable LIST, BREAK-KEY, RESET and create
an ONERR GOTO routine 16K EXT. BASIC TAPE-\$16.95

MATH JOY: Addition & Subtraction

A wonderful educational tool for young children. Superb
Graphics, sound & animation. Combines teaching & drills.
16K ECB TAPE - \$11.95

COLOR PAD

Enhance your artistic capabilities. Draw anything from
planes to landscapes. Create dazzling patterns. Edit, paint,
erase and save to tape or disk. BONUS: Airplanes Color
Sketch Book Program. 16K ECB. No Joystks req.

TAPE - \$16.95 DISK - \$19.95

ORDER TODAY! Check, MO, COD (\$2.50). Add \$1.50 for
S & H. NYS res. please add sales tax.



MICROCOM SOFTWARE

P.O. BOX 214, FAIRPORT, N.Y. 14450

(716) 425-1824

Dealers Inquiries invited



Circle No. 75 on Reader Service Card

NEW:PRODUCT\$

ALPT

The CoCo
Freeware Clearinghouse
Box 1084
Morgantown, WV 26507
(304)599-4492

ALPT is short for Assembly Lan-
guage Programming Toolkit.
It's a tape or disk editor/as-
sembler for 32K or larger ma-
chines. A separate program
prints the documentation. The
Clearinghouse is using the
honor system to earn money
with this product. Forward a
blank tape or formatted disk
with a postage paid mailer and
request programs "Free301A,
B, and C." Disk users should
also request program "Free
301D." The company will ac-
cept user's "contributions"
once they've had a chance to
use ALPT.

Microindex

Serious Personal Computing
Box 7059
South Nashua, NH 03060
(603)888-1376

The Microindex is a reference
source for editorial coverage
of microcomputers, listed by
type of computer and by ap-
plications. United States prices
are: \$99 a year or \$12 an issue
for the monthly version; \$49
a year or \$6 an issue for the
abridged monthly version; and
anywhere from \$5 to \$12 an
issue for annual, "end-of-vol-
ume" versions. Serious Personal
Computing also plans applica-
tion- and micro-specific ver-
sions. The Color Computer ver-
sion, Volume 1, was to be avail-
able in March 1984 for \$5.

OS/9 Programs

Computerware
4403 Manchester Ave.
Suite 102
Encinitas, CA 92024
(619)436-3512

Computerware has a couple
of new products for OS/9 fans.
The Advanced Editor loads O-
Pak files, has 41 commands,
21 line editing commands, and
doesn't ask you to count lines
and characters to move the
pointer. You can edit files larger

than memory because your disk
can become a part of memory.
You'll need OS/9, of course,
and \$39.95 for this disk. Disk
Fix and other OS/9 utilities cost
\$29.95 and give users the abil-
ity to modify drive descriptors,
copy disks and subdirectories,
overwrite files, sort directories
alphanumerically while copy-
ing, and more. Its "Patch" pro-
gram inspects and modifies any
disk file, and "FileLook" displays
file modules without loading
them into memory. "Compare"
compares files with memory.

Elite-File

Elite Software
Box 11224
Pittsburgh, PA 15238
(412)793-8492

Elite-File is an assembly lan-
guage relational data base
manager that lets users define
their data record structures. It
also lets structures be refor-
matted without having to re-
structure the whole data base.
It can handle up to 2000 charac-
ters per record, 4000 records
per file, 16 open files at once,
255 characters per field name,
and 255 named files per record.
Five math operators are avail-
able and values can be calcu-
lated from combinations of field
contents. Print formats can be
set and data may be placed
by field name, with custom text,
anywhere on the printed page.
Data can also be sent to the
screen or saved as an ASCII file.
Elite-File is available on disk only
for \$74.50. It requires 32K and
Disk Basic.

Getting Started With CP/M

by Rob Patten
and Paul Calandrino
Hayden Book Company, Inc.
10 Mulholland Drive
Hasbrouck Heights, NJ 07604
(201)393-6306

Getting Started With CP/M is
for the novice CP/M user. It of-
fers an overview of CP/M's
structure and function, an in-
troduction to and summary of
commands, a command refer-
ence card, and a glossary of
microcomputing.

Please indicate which of the following microcomputers you currently own and/or plan to buy in the next 12 months.

	1 Own	2 Plan to Buy
Apple	A	L
Atari	B	M
Commodore/PET	C	N
Digital Equipment/DEC	D	O
Heath/Zenith	E	P
IBM	F	Q
Radio Shack/Tandy TRS-80	G	R
Color Computer	H	S
Other Tandy/Radio Shack	I	T
Other (specify)	J	U
None	K	V

3 For what, if any business application(s) do you use the microcomputer you currently own?

Please indicate which of the following microcomputers you currently own and/or plan to buy in the next 12 months.

	1 Own	2 Plan to Buy
Apple	A	L
Atari	B	M
Commodore/PET	C	N
Digital Equipment/DEC	D	O
Heath/Zenith	E	P
IBM	F	Q
Radio Shack/Tandy TRS-80	G	R
Color Computer	H	S
Other Tandy/Radio Shack	I	T
Other (specify)	J	U
None	K	V

3 For what, if any business application(s) do you use the microcomputer you currently own?

Please indicate which of the following microcomputers you currently own and/or plan to buy in the next 12 months.

	1 Own	2 Plan to Buy
Apple	A	L
Atari	B	M
Commodore/PET	C	N
Digital Equipment/DEC	D	O
Heath/Zenith	E	P
IBM	F	Q
Radio Shack/Tandy TRS-80	G	R
Color Computer	H	S
Other Tandy/Radio Shack	I	T
Other (specify)	J	U
None	K	V

3 For what, if any business application(s) do you use the microcomputer you currently own?

Circle Number

Void after September 30, 1984

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108
109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126
127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144
145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162
163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198
199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216
217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234
235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252
253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270
271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288
289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306
307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324
325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342
343	344	345	346	347	348	349	350										

CLC7843

PLEASE PRINT CLEARLY—Use only one card per person.

NAME _____ PHONE NO. (____) _____

COMPANY _____ TITLE _____

ADDRESS _____ APT. _____

CITY _____ STATE _____ ZIP _____

4 ☐ Please send me 12 issues of The COLOR COMPUTER for \$17.97 and bill me. (Full 1 year subscription price \$24.97.)

4 How do you use your COLOR COMPUTER?
w. education
x. entertainment
y. personal purposes
z. business purposes

5 Which of the following peripherals do you plan to buy in the next 12 months?

1. Monitor
2. Disk drive
3. Printer
4. Modem
5. RAM chips
6. Keyboard
7. Interface Board

6 Where do you buy software?

8. Mail order
9. Radio Shack computer center
10. Radio Shack store (not computer center)
11. Other computer stores

7 How many software packages do you plan to buy in the next 12 months?

12. 1-2
13. 3-5
14. 6 or more

Circle Number

Void after September 30, 1984

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108
109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126
127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144
145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162
163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198
199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216
217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234
235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252
253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270
271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288
289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306
307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324
325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342
343	344	345	346	347	348	349	350										

CLC7842

PLEASE PRINT CLEARLY—Use only one card per person.

NAME _____ PHONE NO. (____) _____

COMPANY _____ TITLE _____

ADDRESS _____ APT. _____

CITY _____ STATE _____ ZIP _____

4 ☐ Please send me 12 issues of The COLOR COMPUTER for \$17.97 and bill me. (Full 1 year subscription price \$24.97.)

4 How do you use your COLOR COMPUTER?
w. education
x. entertainment
y. personal purposes
z. business purposes

5 Which of the following peripherals do you plan to buy in the next 12 months?

1. Monitor
2. Disk drive
3. Printer
4. Modem
5. RAM chips
6. Keyboard
7. Interface Board

6 Where do you buy software?

8. Mail order
9. Radio Shack computer center
10. Radio Shack store (not computer center)
11. Other computer stores

7 How many software packages do you plan to buy in the next 12 months?

12. 1-2
13. 3-5
14. 6 or more

Circle Number

Void after September 30, 1984

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108
109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126
127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144
145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162
163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198
199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216
217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234
235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252
253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270
271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288
289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306
307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324
325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342
343	344	345	346	347	348	349	350										

CLC7841



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

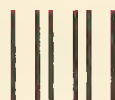
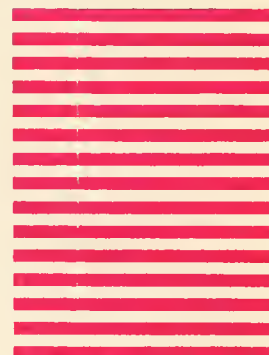
BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 27346 PHILADELPHIA, PA

POSTAGE WILL BE PAID BY ADDRESSEE

THE Color Computer...
MAGAZINE

P.O. Box 13307
Philadelphia, PA 19101



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 27346 PHILADELPHIA, PA

POSTAGE WILL BE PAID BY ADDRESSEE

THE Color Computer...
MAGAZINE

P.O. Box 13307
Philadelphia, PA 19101



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 27346 PHILADELPHIA, PA

POSTAGE WILL BE PAID BY ADDRESSEE

THE Color Computer...
MAGAZINE

P.O. Box 13307
Philadelphia, PA 19101



Moonlighting With Your Personal Computer

by Robert J. Waxman
Ballentine Books
400 Hahn Road
Westminster, MD 21157

Whether you plan to moonlight as a programmer, writer, consultant, or service specialist, *Moonlighting With Your Personal Computer* has a chapter for you. This \$7.95 paperback also has chapters on how to get started, some pitfalls to be wary of, and alternative ways to establish a business.

Fastape

Spectrosystems
11111 N. Kendall Drive
Suite A108
Miami, FL 33176

This \$21.95 utility lets cassette operations execute at 3000 baud. Control key functions change speeds, and there is automatic adjustment of cassette and printer parameters.

DynaCalc for CoCo DOS

Computer Systems Center
13461 Olive Boulevard
Chesterfield, MO 63107
(314)576-5020

Now you don't need Flex to run DynaCalc. DynaCalc for Color Computer DOS runs on any 64K Color Computer with a disk drive. It features a 51-character by 24-column screen, auto repeat keyboard, printer drivers, two-dimensional video, and printed graphics. It costs \$150.

Computers, Education, and Special Needs

by E. Paul Goldenberg, et al
Addison Wesley Publishing
Reading, MA 01867
(617)944-3700

This 288-page, \$13.95 paperback is billed as a practical introduction to the use of computers by and for special needs groups — the handicapped, the disabled, and the excep-

tional. The book addresses the question: What are special needs, who has them, and how can a computer help? Six authors have concentrated on that, and on how communication, access, and motivation are affected when a computer is used as a tool for special needs education.

String Things

Creative Technical Consultants
Box 652
Cedar Crest, NM 87008

Two releases from Creative offer instruction on strings and string variables. Musical Strings is a \$17.95, 16K tutorial tape designed to stimulate musical creativity and an understanding of string variable concepts. *The Guide to String Variables* is a \$3.95 booklet that discusses variables in general, and the specifics of string variables.

Ancestors

Autumn Color Software
4132 Lay Street
Des Moines, IA 50317

Ancestors is a disk-based genealogy program that handles up to 500 records. Records can be displayed on-screen or printed. A three-generation pedigree chart can be displayed and paged forward or backward. Records hold 22 fields, including (besides the expected) fields for occupation, military service, religion, and residence information. Ancestors costs \$39.95 and requires 32K.

Dr. Stan

Dee Pee Data, Inc.
Box 11349
Columbia, SC 29211
(803)254-9595

Winning the on-screen race between spelling students and Dr. Stan is the educational motivation in this program. It accepts words of from two to 18 characters long. When students spell a word correctly three times, they jump ahead, but every time they misspell, Dr. Stan jumps ahead three spaces. You'll need 16K. The program costs \$39.95 on tape, \$49.95 on disk.



NEW GOOD STUFF FOR EVERY COLOR COMPUTER!

MAGIGRAPH—Turn your Color Computer into a graphic design center with the ease of a keystroke! **MagiGraph** makes it simple to create highly detailed figures up to and including an entire high-resolution screen. Designed for those with some experience in Basic and Assembly Language programming, **MagiGraph** includes: A full set of logical and pixel manipulation functions; a design editor; nine animation buffers; versatile I/O routines. If you're looking for the finest graphic development utility available for your computer, THIS IS IT! Cassette \$34.95 (16K required); Disk \$39.95 (32K Extended Color BASIC required); Amdisk cartridge \$44.95.

CSPool: COLOR COMPUTER PRINT SPOOLER

—Stop Waiting Around for the Printer! **CSPool** allows you to use your printer and computer concurrently, takes only 26 bytes of Color Basic's memory, and gives you 32K of print buffer. It's like having two computers in one! By intercepting characters sent to the printer and storing them in the upper 32K of RAM, **CSPool** allows you to run other programs while your printer is doing its job. **CSPool** is FREE with the purchase of a 64K RAM UPGRADE KIT from The Micro Works, or it may be purchased separately on cassette or diskette for \$19.95. Requires 64K; not for FLEX or DS9.

64K MEMORY UPGRADE KIT: For Rev. levels E, ET, NC, TDP-100s, and Color Computer II. Eight prime 64K RAM chips, instructions, and **CSPool**: \$64.95.

MACRO-80C: DISK-BASED EDITOR, ASSEMBLER AND MONITOR

—A powerful 2-pass macro assembler with conditional assembly, local labels, include files and cross referenced symbol tables. Supports the complete Motorola 6809 and 6800 instruction sets in standard source format. Incorporating all the features of our Rompack-based assembler (SDS-80C), **MACRO-80C** contains many more useful instructions and pseudo-ops which aid the programmer and add power and flexibility. The screen-oriented editor is designed for efficient and easy editing of assembly language programs. **MACRO-80C** allows global changes and moving / copying blocks of text. You can edit lines of assembly source which exceed 32 characters. Also includes DCBUG, a machine language monitor which allows examining and altering of memory, setting break points, etc. **MACRO-80C**—along with sample programs—comes on one Radio Shack compatible disk. Extensive documentation. \$99.95

MICRO WORKS COLOR FORTH—This Rompack contains everything you need to run Forth on your Color Computer. **COLOR FORTH** consists of the standard Forth Interest Group (FIG) implementation plus most of FORTH-79. Includes super screen editor with split screen display, a decompiler and other aids for learning more about this fascinating language. Uses Hi-Res graphics, joysticks and sounds. Includes 112-page manual with a glossary of system-specific words, full standard FIG glossary and complete source listing. **MICRO WORKS COLOR FORTH...THE BEST! \$109.95**

SDS-80C—Our famous Rompack editor, assembler and monitor. Complete manual included with this comprehensive software development system. \$89.95

PARALLEL PRINTER INTERFACE—Serial to parallel converter allows use of all standard parallel printers. 600 or 2400 baud. **Pi80C: \$59.95**

MICROTEXT COMMUNICATIONS ROMPACK

—Allows you to get printouts while using your modem. Also download to cassette. General purpose terminal Rompack: \$59.95

Write or call for information
about our complete range of products for every Color Computer!

**THE
MICRO
WORKS**

P.O. BOX 1110-B
Del Mar, CA 92014
(619) 942-2400

California Residents
add 6% Tax
MasterCard/Visa and
COU Accepted

PRICE BREAKTHROUGH

Super Sale on New Disk Drives

Starting at ~~\$169.00!~~ ^{NEW} LOW PRICE

Tandon — Siemens — Remex — MPI — Teac — Shugart — Tabor

40 or 80 Tracks — Single or Dual Head — New 3 1/2" Drivette™

Our Disk Drives are Capable of Single and Dual Density Operation

The **NEWEST** Technology Capable of Operating on Most Popular Computers

Drive a Hard Bargain!!™ For your TRS/80, Color Computer, IBM, Apple, Franklin
5 M.B.-20 M.B. Complete Systems from \$999.95

Diskette Breakthrough — 10 Pack in Library Case — ~~\$18.95~~ ^{NEW} LOW PRICE

SAVE!! PLEASE CALL FOR OUR MOST CURRENT PRICE REDUCTIONS.

TOLL FREE ORDERING

GENERAL AND TECHNICAL

1-800-343-8841

1-617-872-9090

Disk Drives (0123) TRS/80-IBM-Apple - TI Franklin-Max/80-LNW

Model I/III/IV Upgrade (Disk Drives - Memory)

Printers — Daisywheel/Dot Matrix

Percom Double Density Controller (Model I)

Color Computer Printer Interfaces

Disk Drive Operating Systems

Repair Services Now Offered — FAST Turn-a-Round

Apple/Franklin Compatible Add-On Drives with Case & Cable

Diskettes in Library Cases

DISK DRIVE CASES AND POWER SUPPLIES starting at \$59.95

Printer **Buffers** 8K to 512K starting at \$143.95

Holmes Model I/III Speed-up Mod starting at \$90.00

Cables — Printer/Disk Drive starting at \$23.00

Warranty on Disk Drives — 6 Months to 1 Year

SOFTWARE SUPPORT, INC.

One Edgell Road, Framingham, MA 01701 (617) 872-9090

Hours: Mon. thru Fri. 9:30 am to 5:30 (E.S.T.) Sat. 10 am to 4:30 pm

DEALER INQUIRIES INVITED.

TERMS:

M.C./Visa/Amex and personal

checks accepted at no extra charge.

C.O.D., please add \$3.00.

Shipping: Please call for amount.

Not responsible for typographical errors.

CANADA

MICRO R.G.S. INC.

751, CARRE VICTORIA, SUITE 403

MONTREAL, QUEBEC, CANADA, H2Y 2J3

Regular Tel. (514) 845-1534

Canadian Toll Free 800-361-5155

Service! Service!

All in stock products are shipped within 24 hours of order.

Repair/Warranty service is performed within 24 hours of receipt unless otherwise noted. We accept C.O.D., foreign and APO orders. School and D&B corporate P.O.s accepted.

TRS/80 Registered Trademark Tandy Corp. IBM-PC Registered IBM Corp. Apple Registered Trademark Apple Computer Corp.

Franklin Registered Trademark Franklin Corp. Max/80 Registered Trademark Lobo Int.

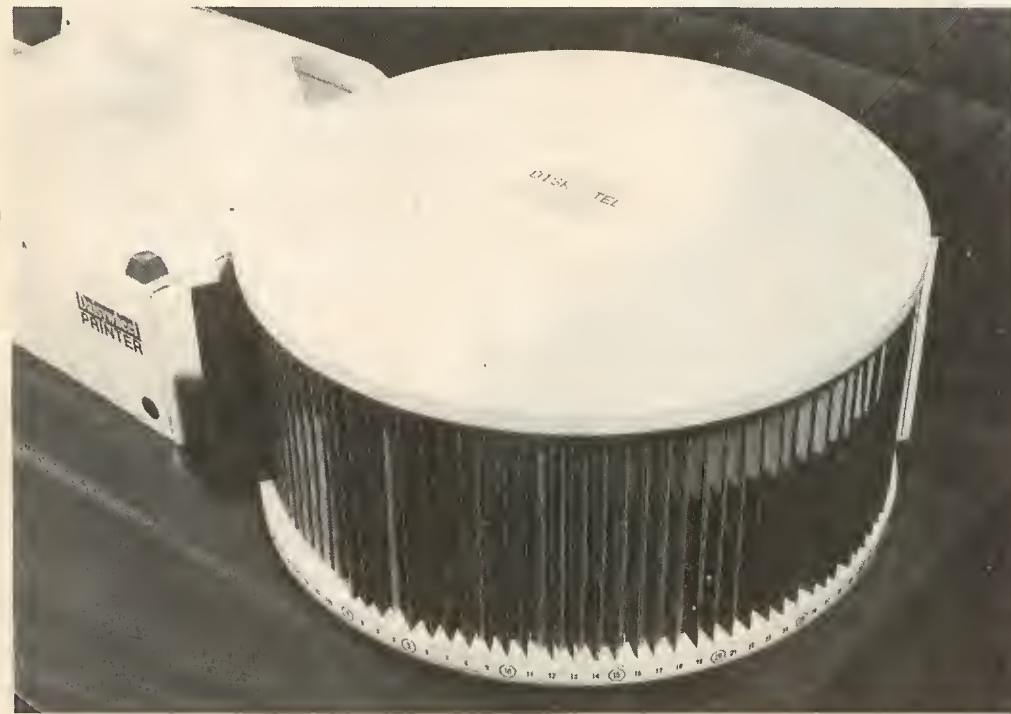
DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES

Disk-O-Tel

Close Enterprises
Box 13903, Department 39
Arlington, TX 76013
(817)429-9006

Here's a lazy Susan-type disk storage unit for you. It's 14 inches wide, six inches tall, and mounted on ball-bearings. Your disks will be stored dust-free,

Close claims. An index is included. The desktop unit costs \$49.95. Another "high rise" unit mounted on a swivel arm and desktop clamp costs \$59.95.



Hi-Res Screen Print Utilities Program

Radio Shack
1800 One Tandy Center
Fort Worth, TX 76102
(817)390-3300

Users can print in four colors or in black and white with this \$9.95 cassette program. Dump programs of both types are included for print-outs of charts, graphs, logos, or what have you. You'll need at least 16K.

Micro Games

Radio Shack
1800 One Tandy Center
Fort Worth, TX 76102
(817)390-3300

MC-10ers and Micro Color users get five games on a \$9.95 tape. "Pong" is self-explanatory. "Breakout" is something like pinball. "Egg Catch" is over when the bird covers the ground with eggs. It's a flying egg-laying bird and users have to catch eggs in the air and

OMNI DISKETTES AT DISCOUNT PRICES!



1-800-334-DISK

1-617-839-4404 (Mass. Only)



FINALLY — GET OMNI QUALITY AT PRICES YOU CAN AFFORD! ORDER BELOW TODAY.

OMNI PREMIUM DISKS Priced in Quantities of 10	
#5111 (SS/SD)	\$17.90
#5121 (SS/DD)	\$23.90
#5221 (DS/DD)	\$32.50
#5321 Flip/Floppy Reversible (double density)	\$29.90
#5141 (SS/QD-96TPI)	\$41.90
#5241 (DS/QD-96TPI)	\$49.90



OMNI INTELLIGENT DISKS
Built-in Temperature & Humidity Sensors on each Disk. Toughest 100% Certification at 65% Clipping Levels.

OMNI INTELLIGENT DISKS Priced in Quantities of 10	
#IN5121 (SS/DD)	\$39.90
#IN5221 (DS/DD)	\$49.90
#IN5141 (SS/QD-96TPI)	\$54.90
#IN5241 (DS/QD-96TPI)	\$59.90

ADD \$2.00 S.&H. PER ORDER Info Line 617-839-4405
M/C - VISA - M.O. - C.O.D. (+1.85) - Check Dealer
Mass. Res. Add 5% Tax Inquiries Welcome

MAGNETICS, INC.
P.O. Box 98
So. Grafton, MA 01560

Circle No. 148 on Reader Service Card

"Checkbook-Checkwriter II" is available for:
Apple II • and Apple II+ •
TRS-80 • Color Computer

Check Us Out!



Product: Continuous fan-folded checks with dual-windowed envelopes, checkbook binder and software designed especially for computer use in the home. You can't get continuous checks like these anywhere in the world.



Savings: Special package — including software — to get you started. 200 checks, 100 envelopes and binder—\$59.95. 500 checks, 300 envelopes and binder—\$79.95. Both with our versatile "Checkbook-Checkwriter II" program that will have you printing your checks the day you receive them.

SPECIAL BONUS:

- Each 250th customer—50% off your order;
- Each 500th customer—your order free;
- Each 1000th customer—your order free, and free check refills for life.



Guarantee: Our checks and accessories are guaranteed to please you and guaranteed compatible with your bank. In fact, if you order a special package and aren't satisfied for any reason, simply return it for a full refund (including postage) and you can keep the "Checkbook-Checkwriter II" program.

Now CHECK WITH US...Order a special package with moneyback guarantee today! Just enclose a voided check for encoding information with your order. Or send today for our free information package. We guarantee you'll be pleased. Visa, M.C., AMEX orders welcome. Shipping: \$2.00 USA, \$5.00 Outside USA.

EMAIL ADDRESS: microNETCS 70070336

SYNERGETIC SOLUTIONS

4715 SHEPHERD RD • MULBERRY, FL 33860 • PHONE (813) 646-6557



Circle No. 144 on Reader Service Card

Color Computer/115



DON'T GET BURNED

THE COLOR BURNER FROM GREEN MOUNTAIN MICRO

Lately I've been hearing that you want to program erasable read-only memories (EPROMs). It seems you want to create your own program cartridges, or make changes to your Basic ROMs, or turn your CoCo into some different animal.

The problem is, most EPROM programmers cost over \$100, and \$100 is big dues to pay. You want to burn EPROMs, not get burned in price — or quality.

So, I've put together the Color Burner, an EPROM programmer that will burn all the "27" family — 2716, 2732, 2764, 27128. Yes, it will also burn 68764 replacements for your Basic ROMs and, no, it won't break your budget.

Although my Color Burner doesn't cost a whole lot, you won't get burned over quality. I don't cut corners in hardware. I use the best fiberglass boards, with gold edges, protective solder masking and silk-screened legends. Before I send you a Color Burner, I test it by actually programming an EPROM.

So how can it be good if it's so inexpensive? First of all, you can only get a Color Burner from Green Mountain Micro. No dealers are adding to its price. Second, it isn't fancy. No high-tech power supplies are in sight. You've got to add three homely, low-tech 9-volt batteries to get it

going. Finally, it won't set new standards of complexity. It's simple, hardworking and reliable.

You can get your Color Burner complete or *a la carte*: try an assembled and tested unit, a kit, or just a bare board. Order it with or without programming software. Both kits and assembled units come with over 40 pages of documentation, complete program listings, and schematics. Nothing is hidden.

You'll burn those EPROMs, you won't get burned, and my technical support staff will keep you from getting burned up if you have a question or need help.

You Won't Get Burned with The Color Burner

- Assembled/tested with software, \$69.95.
- Assembled/tested only, \$64.95.
- Complete kit with software, \$56.95.
- Complete kit only, \$49.95.
- Board/documentation with software, \$30
- Board/documentation, \$23
- Bare board only, \$20
- ColorPack 8/16K ROM/RAM cartridge kit, \$19.95.
- 2716 and 2732 EPROMs available.

Specifications:

Programs 24/28-pin EPROMs, providing 21/25-volt programming pulses under software control. Includes unwired personality module. Requires three 9-volt batteries (not included). Tape software supports 2716 through 27128 and 68764/66 EPROM families, and requires 32/64K Extended Color Basic.

ALSO AVAILABLE FROM GREEN MOUNTAIN MICRO

Lowerkit II*, \$79.95 /\$49.95 kit

64K Color memory upgrade kit, \$49.95

MC-10 added 4K upgrade kit, \$19.95

CoCoPort interface, \$49.95 /\$39.95 kit

RAM/ROM pack, \$29.95 /\$19.95 kit

Scroll-A-Roll software video text display, \$24.95

TV Buff II*, improved to handle virtually all monitors, \$14.95

Color Quaver, Software Music Synthesizer, \$19.95

(Add \$2.50 shipping and handling)

*Specify Color Computer or CoCo II

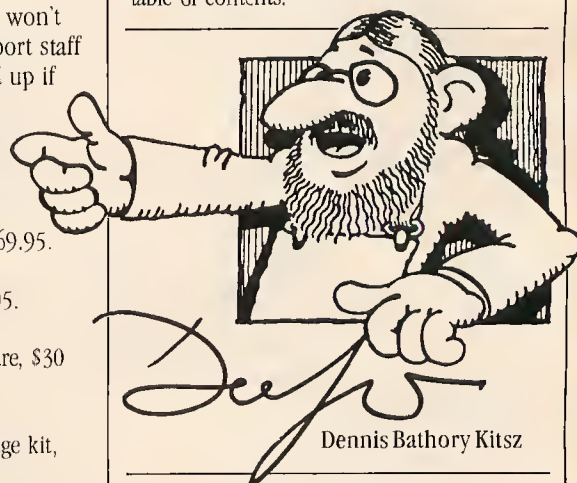
The Micro Language Lab Presents "Learning the 6809"

- Authored by Color Computer Magazine columnist Dennis Bathory Kitsz
- 24 half-hour lessons on twelve cassettes
- 236 pages of text and complete dox for all the smart chips, including 6809E, 6821, 6847, and 6883
- 35 sample programs ready to load, list, and run
- 1,500 programmed question and answer system
- Learn not only how to put a dot on a screen, but also where and why.

\$99.00 (plus \$3.50 shipping and handling).

Dealer and club inquiries invited.

Not sure? Request our sample page and table of contents.



Dennis Bathory Kitsz

Green Mountain Micro
Bathory Road, Box C
Roxbury, Vermont 05669
802-485-6112

Hours: 9am-5pm, Monday-Friday
COD/VISA/MASTERCARD
TRS-80 is a trademark of Tandy Corporation

try to shoot the bird. "Lunar Lander" has you land a spacecraft on Luna. To do it right you must reach zero altitude at zero velocity, otherwise you crash. And in "Horse Race," "every horse has an equal chance of winning," says the Shack.

Basic Programming Utilities and Print Spooler

Computerware
Box 668
4403 Manchester Avenue
Suite 102
Encinitas, CA 92024
(619)436-3512

The Basic Programming Utilities and Print Spooler comes with five utilities. "Sprint" sets up a print buffer so you can print as your computer keeps working. "BasRef" prints a variable and line number cross reference list. "Vdump" prints values of all variables. "CCexpand" combines Sprint with a 51-character by 24-column screen, a 25K

printer buffer. "Fixdir" cleans up Basic's disk directory, offering an alphabetized directory, program information, and a disk map. The package costs \$19.95 on tape and \$24.95 on disk and requires 32K.

Spell 'N Fix II

Star Kits
Box 209
Mt. Kisco, NY 10549
(914)241-0287

Spell 'N Fix II splits your screen into two windows. The top window shows text as it's being read. The bottom shows program status, misspelled words, and possible alternative spellings. It comes with a 20,000-word dictionary and room enough for another 20,000 words, technical and foreign words included. Once a word is corrected Spell 'N Fix remembers both the incorrect and correct versions and will suggest the correct one if and when the incorrect version is encountered again. The pro-

gram requires a 32K system and a disk. It, plus the manual, costs \$69.29. The original version costs \$49.39 and owners may upgrade for a modest charge.

A Critic's Guide to Software for CP/M Computers

by Phillip I. Good
Chilton Book Company
Radnor, PA 19089
(800)345-1214

This \$12.95 paperback has four sections: one on the programs everyone needs, one on mathematical and statistical software, one on successful software selection, and one on software for the programming professional. Besides covering word processors, spreadsheets, and database managers, the book discusses business, accounting, agricultural, legal, and management software, languages, and software directories. Oh yes, there's an appendix on games, too.

Car Manager

80 Custom Software
5720 Brooke Lane
Sylvani, OH 43560

Compute your mileage and how much it costs to operate your vehicle per mile, and keep track of your gasoline, maintenance, and repair costs with Car Manager. Records can show up on your screen or printer. This program costs \$12.95 on tape, \$15.95 on disk, and requires at least 16K.

Stock Tracking

Parsons Software
118 Woodshire Drive
Parkersburg, WV 26101

Investors will be interested in two programs from Parsons, Fundgraph and Fundfile, both disk based. Fundgraph costs \$69.95, runs on 16K or 32K, and offers analysis of stocks or funds. Fundfile, for \$37.95, requires 32K and analyzes portfolios. Each works independently of the other.

Need a Printer for your
Color Computer?

We Have The Connection!

Radio Shack

The biggest name in little computers

TRS-80

Color Computer

FROM **\$164**

Color Disc. **\$329**

OS-9. **\$57**

Multi-Pack **\$139**

Mouse **\$36**

Joysticks **\$19**

Call for pricing on complete TRS-80 line.

We can **connect your** Radio Shack Color **Computer to** any of these popular **name brand printers**. . . **call** for more info.

star
MICRONICS-100

\$282

EPSON

Call for
current prices

OKIDATA

Microline 92
call for prices

C. Itoh

Prowriter

\$345

SCM SMITH
CORONA

As low as

\$249

We carry a full line of computers, printers, modems, monitors and accessories. Call for your best prices.

FREE

UPON REQUEST • PRICE LIST AND INFORMATION KIT • COPY OF MFR'S WARRANTY • PRICES AND PRODUCTS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

All equipment is sold with the full manufacturers warranty.



**Micro Management
Systems, Inc.**

2803 Thomasville Road East
Cairo, Georgia 31728
TELEMARKET DEPT.

1-800-841-0860
CONVENIENT ORDER ENTRY

GA. & INFO.
912-377-7120

★B-5 Software★

B-5 believes your Color Computer is a unique teaching tool. Our programs have been created by teaching professionals to give your children the help they need. B5 incorporates fun with basic learning skills.

EDUCATIONAL PROGRAMS

4★CLOCK

Grades 1-4
16K Cass. \$24.95; 32K Disk \$26.95

4★BORROW

Grades 2-4
16K Cass. \$19.95; 32K Disk \$21.95

4★MONEY

Grades 2-4
16K Cass. \$19.95; 16K Disk \$21.95

4★CARRY

Grades 2-4
16K Cass. \$19.95; 32K Disk \$21.95

4★MATHFACT

Grades 1-5
16K Cass. \$16.95; 32K Disk \$18.95

SKIP COUNTING

Grades 1-4
16K Cass. \$16.95; 32K Disk \$18.95

QUESTION

Grades 1-8
16K Cass. \$19.95; 32K Disk \$21.95

HANGWORD & SCRAMBLE

Grades 1-8
16K Cass. \$14.95; 32K Disk \$16.95

SPELLING

Grades 1-8
16K Cass. \$16.95; 32K Disk \$18.95

KEYBOARD

Grades 1-8 16K Cass. \$19.95;
32K Cass. \$24.95; 32K Disk \$26.95

ABC's

Grades K-1
16K Cass. \$9.95; 16K Disk \$11.95

All B-5 programs require
Extended Basic.

BROCHURES UPON REQUEST

Ask your Dealer for a Demonstration today!

If unavailable locally, send check or money order to:

DATA TAPE LISTINGS

Data Tapes may be used with other B5 programs.
They cannot be used alone.

Use With Keyboard Program

KEYBOARD PHONIC DRILL - letter, word and sentence finger drills using common vowel and consonant combinations. \$8.95

Use With Keyboard, Spelling or Hangword Programs
DOLCH WORDS - 273 words used most often in beginning readers. \$8.95

GRADE LEVEL SPELLING - over 300 words on each tape; each lesson follows a phonic rule. Available for grades 2, 3, 4, 5, and 6. \$8.95 per grade level.

SPACE WORDS - over 300 words to challenge and motivate the superior speller. Grades 4-8. \$8.95

ADULT WORDS - most often misspelled words. Highly challenging. \$8.95

Use With Questions Program

NOUNS AND VERBS - 4 lessons on nouns and 4 on verbs. Grades 3-5. \$8.95

READING COMPREHENSION - lessons build from simple to complex. Grades 2-4.

Main Idea	\$10.95
Sequencing	\$10.95
Fact & Opinion	\$10.95
Cause & Effect	\$10.95
Complete Series of 4	\$39.95

B5 Software

1024 Bainbridge Place
Columbus, Ohio 43228
(614) 276-2752

Free Shipping in U.S.A. & Canada
(Ohio residents add 5.5% Sales Tax)

Circle No. 4 on Reader Service Card

Sugar
Software

OK! So your information
is in the computer!
Now what?

For all your record storage
and printing needs.

\$24.95 - Tape

Disk compatible
16K ECB

- class lists
- recipes
- Color Computer programs
- stamp, coin, record collections
- stocks, bonds, bank accounts
- business inventory

- Modify mode
- User selected report formats
- Fast ML sort (3 fields), search and delete
- Variable field length
- Variable record length
- Up to 8 user-definable fields per record



Tape Information
Management System

Both Tims and Timsmail feature:

- Send formatted files to tape, disk or printer
- Up to 230 characters per record
- Upper and lower case
- Search for specific item
- Search for records within range
- Search on selected field

For all your
mailing needs.



\$19.95 - Tape

Disk compatible
32K ECB

- small business
- club or organization
- church
- Christmas cards

- User selected label formats
- Continuous or single sheet
- Designed for 80 column printers
- 1, 2 or 3 labels wide
- 2.5, 2.75, 3, 3.5 and 4" labels
- Select records to print

SUGAR SOFTWARE

2153 Leah Lane
Reynoldsburg, Ohio 43068
(614) 861-0565

Gift Certificates
are available in any amount!

A complete catalog of other sweet Sugar Software products is available.

Add \$1.00 per tape for postage and handling. Ohioans add 5.5% sales tax. COD orders are welcome. CIS orders EMAIL to 70405, 1374. Dealer inquiries invited.



Circle No. 61 on Reader Service Card

Advertisers' Index

Page	Reader Service Number	Advertiser	Page	Reader Service Number	Advertiser
C-4	88	Amdek Corp	2	34	Homebase/Workbase
93	1	Analog Micro			Data Systems
40	105	Apple Valley	51	151	Howard Medical
65	104	B&B Software	39	150	I.T.I.
15	3	Basic Technology	29	68	J&L Educat'I Sys./
118	4	B-5 Software			Colc. Hobby
95	29	Botek Instruments	45	100	J&M Systems
16	2	Carnival House	79	37	JBM Group
20	5	Cer Comp	100	20	Keytronic
65	7	Chattanooga Choo	82	149	Macrotron
		Choo	115	148	Magnetics
104	6	Classical Computing	15	71	Mark Data Products
109	32	CNR Engineering	106	72	Mark Data Products
55	9	Cognitec	85	73	Mark Data Products
1	10	Color Power Unlimited	103	74	Mark Data Products
105	142	Color Software	117	76	Micro Management
		Services/Brantex			Systems
109	153	Colortech	112	75	Microcom Software
34, 35	12	Colorware Inc.	102	87	Microware Systems
96, 97	69	Compuserve	113	42	Microworks
29	13	Computer House	73	43	Moreton Bay Software
63	14	Computer Plus	119	147	Mr. Gerbois
92	102	Computer Systems	39	44	North Glenn Software
		Center	119	45	Panamax
112	38	Computer Systems	104	77	Parallel Systems
		Consultants	49	46	PBH Computer Products
66, 67	15	Computerware	56	47	PBJ Inc
21	90	Computize	25	48	Petrocci Freelance
15	155	Cosmos Computer	94	79	Prickly-Pear Software
101	*	Counterpoint Software	64	146	Programs Intellect
29	18	Cynwyn	46, 47	50	Radio Shack
19	19	Databar	59	101	Reitz Computer Center
99	40	Deft Systems	111	145	Robotic Microsystems
58	22	Delkner Electronics	20	80	Sailors Systems
C-2	23	Dennison			Software
72	24	Derringer Software	91	51	Satum Electronics
86	25	Dorsett Education	33	56	Skyline
		Systems	12, 13	57	Softlaw
10	*	Double Density	89	58	Softmart
		Software	114	*	Software Support
108	26	DSL Computer	118	61	Sugar Software
		Products	115	144	Synergetic Solutions
75	41	Duggars Growing	17	143	Syntactics
		System	111	64	T&D Software
107	27	EAP	C-3	63	TCE Programs
88	30	Federal Hill Software	110	*	Tom Mix Software
27	156	First Coast Systems	74	*	Tom Mix Software
53	67	Frank Hogg Laboratory	68	82	Triad Pictures
116	31	Green Mountain Micro	7	89	True Data Products
26	157	GrownUps Toys	87	65	Wayne Technology
		(GROTO)	11	*	Woodstown
64	35	H.S. Co.			Electronics
36	33	HJL Products	107	66	York 10

MR. GERBOIS PRO-MAILER

Professional Disk Mailing List Program

- Print Labels or Lists
- Sort By Zip or Alpha
- Code & Search Records
- 32K Handles 1000 Records

NEW!

NEWLY RELEASED FOR COCO! GOES
FAR BEYOND OTHER LIST PROGRAMS

MR. GERBOIS

571 W. Front ST.
Red Bank, N.J. 07701

Only **\$59.⁹⁵**

Send Today \$5.

(Refund W/ Purchase) For Manual

Circle No. 147 on Reader Service Card

Go for the "MAX"™

Panamax
Surge Suppressors
provide the fastest
response time and
highest energy
dissipation available
to assure you the
maximum protection
against over voltage
"Spikes and glitches".
Priced from \$59.00

See us at Seattle
and Dallas C.S.E.

PANAMAX

Toll Free 1-800-472-5555

In California call 415-472-5547

150 Mitchell Boulevard, San Rafael, CA 94903

Please see us at Washington, D.C.
Houston, and Anaheim, C.S.E.



Circle No. 45 on Reader Service Card



he books, disks, computers, and furniture in my office are buried under an inch and a half of dust. I haven't seen this for myself; my wife went to the office a few days ago to pick up my paycheck and told me about it during our phone conversation that night. She called to thank me for the birthday card I sent her, and to tell me the puppy we got last Christmas is almost full grown. I'll bet he's a handsome dog. Caron, if you're reading this, please send a picture of Otis to me in care of The Next Computer Show, to be held for too many days in Yet Another Exciting Location, USA.

Please excuse the personal note, I barely have time to write letters home. Oh sure, the occasional post card... but it's hard to squeeze much writing onto them, and I'm usually in a hurry as I scribble a few words at the boarding gate while waiting for my flight to Yet Another Exciting Location, USA.

If this sounds like a personal problem, you're mistaken. Software and peripheral companies, magazines, hardware manufacturers, and OEM salespersons all converge on city after city, week after week, to be at The Next Computer Show which, by the way, promises to be "The Biggest and Best, Most Comprehensive Collection of Formatted Data Disks Ever Assembled in One Location." Oh boy, can't miss that one. Better get another Master Card for expenses, the other four are full. At the show I see familiar faces from the previous show, and the one before that, and come to think of it, the 10 before that. If I saw my wife that often I wouldn't have to wear a name tag when she picks me up at the airport.

Still sound like a family problem? XYZ Software Company, your favorite Color Computer software vendor, goes to five computer shows in 1984. Joe Sector, the company president, sends at least two employees to work the booth. They arrive in the show's host town the day before the show (to set up) and leave the day after (to break the booth down). The show lasts three days, so the employees are there for five. They stay in a hotel convenient to the show location. By the time they return to their home office, XYZ has spent thousands of dollars on transportation, hotel accommodations, food, taxis, and maybe some entertainment. This doesn't include the cost of being in the show, freight expenses for the booth and show materials, and employee time away from their normal daily work load at the office.

Exhibitors don't always go to shows expecting to make lots of money. The important thing is being there; *presence*. Presence is very important in this industry where today's big names are tomorrow's memories. Not showing at CompuShow '84 could start rumors of XYZ's shaky finances, that they're about to file under Chapter 11, or missed a production deadline for a new product. Soon all of XYZ's retail dealers are afraid to spend money on their products, preferring instead to stock the products of their competitor who was at the show (and probably started all the rumors). Okay already, says you the reader, we can see why our favorite software company goes to so many computer shows, so what's this mean to me? Just a dollar or two or three out of your pocket every time you buy a piece of XYZ software.

Don't blame XYZ, blame the show promoters. They are geniuses at creating so many "must attend" events. Oh, yes, says the show promoter, we'll put one in every corner of the country so people won't have to travel far to attend, and we'll call them CompuShow East and West and North and South and Central and West Central and East Central.

Not long ago there were only a few shows and everyone went to them all. That was fine; you could depend on seeing people you had to see. For example, if I needed to meet with Mr. World Renowned Joe Expert and didn't want to make

a special trip to his office in Who Knows Where, USA, I would only have to go to The Big Computer Show knowing he would be there. With all the shows nowadays there's a good chance Joe Expert and I will not attend the same 50 shows, and one of us will have to make a special trip to see the other. Yes, I've heard of the telephone, but things tend to get accomplished faster when you talk about them in person.

The existence of too many computer shows serves no positive purpose. The success of the Color Computer proves it. I remember big showy booths by the likes of Texas Instruments, Atari, and Timex/Sinclair at shows like Comdex, CES, Northeast Computer Show, and West Coast Computer Faire. Nearby were all the folks supporting those machines with software packages and add-on products. How wonderful it all looked! By contrast, Tandy Corporation hardly ever appears at shows. Neither do the people in the TRS-80 support industry. Yet Tandy remains a strong force in the microcomputer market while the others have fallen like dominos on a tilted table, followed by many of the support folks.

If Tandy put on the dog at shows, the people you buy your software from would have to go to those gatherings also, just as those who support the IBM PC and Apple Mac must. And you, like owners of those other computers, might have to pay \$695 for a word processor, or \$59.95 for a game. I don't mind paying a fair price for software, but I don't want to pay for XYZ's trips to All Those Exciting Cities, USA. Do you?

Although the Color Computer has been able to stay aloof from most of the show glitter and hoopla, it is by no means immune. The same fear, of no *presence*, can occur in smaller special interest shows. Even in these smaller special interest gatherings, small companies find it difficult to compete with the ambitions of the relative few and are forced out of the competition not because their products are inferior, but because the cost of presence can prove to be too much.

The Color Computer support industry should be wary of hopping around the country at the behest of others. I used to get notices of a new Applefest almost weekly. Very few are held now; only two on a national scale. Very few Applefests does not mean fewer Apples in people's homes: the Apple IIe continues to sell well, as does the company's newest machine, the Macintosh. But people providing Apple users with fine software and add-ons could not afford the time or money necessary to maintain a home office as well as a road office. Many of the companies involved were small operations based in people's homes, doing business during evenings and weekends mainly as a secondary source of income, as are many of the Color Computer support industry. They could not justify the expense to support this secondary business, nor could they justify so much time away from their other jobs — their primary means of support. Their discontinued enthusiasm reduced Applefests to a more realistic number.

Show promoters who read this as an attack on their means of earning income are doing us a disservice. Market strength is not measured by the number of shows a promoter puts on. Totally eliminating shows would be a grand mistake: but I resent the disregard promoters have for my time.

I have severely cut back my show attendance schedule. I suspect I am not alone. I have asked my wife to get a refund on her reserved parking space at the airport and cancel at least two of her seven night classes at the university extension: No, I'm not becoming a stick in the mud. Like everyone I enjoy a little time on the road. I've just begun to emphasize the phrase *a little*; that's all.

— K.L., Editor-in-Chief

**SEND
FOR FREE
CATALOG**



**Dealer
inquiries
invited**

ABC'S IN COLOR

In the ABC program, all 26 letters spring up in color to the familiar ABC tune. Then, colorful detailed pictures depicting each individual letter of the alphabet appear one by one. Your child's fascination will mount as he or she correctly presses the letter on the keyboard and is rewarded with a musical tune before the next detailed picture is drawn line by line onto the screen: AIRPLANE for A, BUS for B, CLOWN for C and so on to ZEBRA for Z. Truly a must program for the preschool to first grade age group!



CoCo 16K ECB Tape: \$19.95 Disk: \$25.95

CRISS—CROSS MATH

As the program begins, your child is presented with a nine square playing board. It is your choice as to which square you choose. After a choice is made, a MATH PROBLEM appears in the square. You score your first X by answering the problem correctly. If your answer is incorrect, the square clears and your opponent is allowed his choice of squares. The game is over when three squares vertically, horizontally, or diagonally are won by the same player. When playing against the computer, every answer you get wrong is won by the computer. Multi-level ADDITION AND SUBTRACTION program.

CoCo 16K Tape: \$12.95

FRACTIONS

SIDE ONE: Fraction Lessons, explains fractions with the aid of graphics. Child studies the different ways fractions can be represented. Lessons include:

IMPROPER FRACTIONS
MIXED FRACTIONS
PROPER FRACTIONS

Many educators have praised the use of motion and color to display the fractional equivalents.

SIDE TWO: Fraction practice, offers a random computer generated quiz.

Atari 16k Tape: \$19.95

CoCo 16k Tape: \$19.95

JOYSTICK DRAW

Joystick Draw is the simple way to explore your artistic talents! Program operation is easy enough for a child to use, but effective enough that TCE uses it to design many sophisticated high-resolution graphic screens. Joystick Draw's design allows you or your child to save those masterpieces for future revisions or for use in other programs (instructions included). Your child will spend many hours enjoying this program and at the same time improving his or her eye hand coordination! You will find Joystick Draw to be an easy way to design those more sophisticated graphics for your own programs!

CoCo 16K ECB Tape: \$16.95



**Additional Educational Software available
for Color Computer, TDP 100, Atari®,
Apple®, Commodore 64®, and VIC 20®.**



SPELL BOMBER

As captain of your ship, you must destroy the enemy bomber by spelling the mystery word. In this exciting and educational game the bomber gets closer with each inaccurate letter. You have only EIGHT tries to guess the mystery word or your ship will be bombed! If you guess the word correctly, GENERAL QUARTERS will sound and your ship will fire a missile to destroy the bomber. Three levels are available: EASY, MEDIUM, and HARD. Challenging for all ages!

Atari 16K Tape: \$18.95

CoCo 16k ECB Tape: \$18.95 Disk: \$22.95

Vic 20 13k Tape: \$18.95

SPELLING BEE

The word is pronounced vocally and it is up to you to type in the correct spelling. If wrong, the computer will be your friend and flash the word on the screen for just an instant. OK! Try typing the word in again. STILL WRONG! The computer wants success and allows you to see the word again this time a little longer. If you just can't spell the word, the computer realizes you need to learn to spell the word and leaves the word on the screen for you to copy. Try your best and the computer has a surprise for your reward!

SPELLING BEE I ... GRADE 1 & 2 SPELLING BEE III ... GRADE 5 & 6

SPELLING BEE II ... GRADE 3 & 4 SPELLING BEE IV ... GRADE 7 & 8

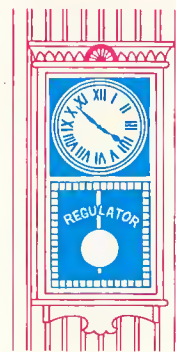
CoCo 16k ECB TAPE: \$16.95 Each

TC—INVENTORY

Many insurance companies offer a discount for policy holders which have complete inventories on file. TC — Inventory is designed to help you organize, maintain, and compile the personal belongings of your home. Program is user friendly and menu driven. TC — Inventory allows input for location of item, price of item, serial number of item, date of purchase, and a text written description of the item. Don't put off recording your personal belongings until its too late. Requires printer for hard copy.

CoCo 32k ECB Tape: \$16.95

TEACHING CLOCK



Torn between teaching time on a digital or a conventional (face and hands) clock? Well, this program combines the two using high resolution graphics and prompts! Your child will learn to tell time with the aid of a specially designed CLOCK! Child enters the time, if wrong, the center of the clock displays a graphic aid. If the child is correct a musical reward is heard. Program offers three levels: hours, quarter hours, and five minute intervals.

Apple 48k Disk: \$19.95

Atari 32k Tape: \$16.95

CoCo 16k ECB Disk: \$19.95 Tape: \$16.95

P.O. Box 2477 Gaithersburg, Maryland 20879 (301) 963-3848

Circle No. 63 on Reader Service Card

624 KBYTE SYSTEM!



ONLY \$499⁰⁰
(Including 2 Diskettes)

**New
3" disk
cartridge**

AMDISK YOUR COLOR COMPUTER[®]

Get 312 Kbytes* of on-line, formatted storage capacity for your Color Computer with the Amdisk-III. The Amdisk-III is a disk drive system that combines the capacity and compatibility of 5¼" floppies with the convenient size and ruggedness of the state-of-the-art in technology — the 3" microfloppy cartridge.

Join the move to maximize your Color Computer's power and "Amdisk" it. Many software vendors have joined, and will be providing software on Amdisk's 3" cartridge upon request. These software suppliers are: Cognited; Computerware; Frank Hogg Laboratories; The MicroWorks; Tom Mix Software; Moreton Bay Software; Nelson Software Systems; Petrocci Freelance Associates; Prickly Pear Software; Saguaro Software; Skyline Marketing; The Software Station; Spectrum Projects; Star-Kits and Sugar Software.

*An additional 312 Kbytes may be accessed by manually flipping the media over.

[®] Color Computer is a registered trademark of Tandy Corporation.

Single Drive Version Available — \$379⁰⁰

You can purchase the Amdisk-III from any of these fine dealers:

Computerware: (613) 436-3512
DATAMAN: (416) 529-1313
Delker Electronics: (615) 453-2636
Emerald Computer: (800) 468-4606
Saguaro Software: (602) 355-6508
Skyline Marketing: (312) 298-0762
The Software Station: (313) 532-2550
Spectrum Projects: (212) 441-2807
or ask for the Amdisk-III at your local computer dealer.

Head Office: Elk Grove Village, IL 60007
(312) 344-1100 • TLX: 25-4763

Regional Offices: Southern Calif. (714) 552-3749 • Texas (817) 478-2334
Northern Calif. (408) 370-9370 • Denver (303) 794-1497

AMDEK

Circle No. 85 on Reader Service Card